RAILROAD GAZETTE

FRIDAY, JAN. 20, 1893.

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Contributions.

Railroad Abbreviations.

New York, New Haven & Hartford Railroad Co., Superintendent's Office, Air Line Division.
NEW HAVEN, Conn., Jan. 17, 1893.

TO THE EDITOR OF THE RAILROAD GARETTE:

In your article on railroad abbreviations (page 31, Jan. 13) you seem to favor a still more extended use of letters rather than numerals.

With the increasing use of the telephone in railroad operations, consideration should be given to what is best adapted to that means of communication.

That the use of letters is attended with difficulty with the telephone may be ascertained by any one trying to use the same. B will sound as D, T as E, C as G, and many others that really have different sounds are apt to be mistaken. Letters are also liable to be mistaken for words which have the same pronunciation as the names of the letters, *i.e.*, B, C, T, O, U., etc., may be interpreted as be, bee, see, sea, tea or the, oh, owe, you; while I is often taken for the personal pronoun, for it is much more difficult to pick out words from the drift of conversation over the telephone than it is to decipher bad writing from the tenor of the article. The use of numbers is attended with sufficient difficulty, as those of us can testify who have tried to call 32, only to have it repeated 82, or 510 and get 910; but letters are still worse.

A. S. OSTRANDER.

Specifications and Tests for Driving Wheel Tires.

Pittsburgh Testing Laboratory,
PITTSBURGH, Pa., Jan. 10, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

With reference to the editorial regarding steel tire in your issue of Jan. 6, it may be of interest to you and perhaps to your readers to give you the specifications which the Pittsburgh Testing Laboratory recommend to their clients for steel tires, and I would say in this connection that these specifications are the same that I used in making steel tires at the Nashua Iron & Steel Co., Nashua, N. H., some 13 or 14 years ago, and which gave there excellent results.

Tires are divided into four grades according to service; grade No. 1 being for fast locomotives, of inside diameter of 54 in. and above; No. 2 for small tires, between 40 in. and 54 in.; grade No. 3, smaller tires, under 40 in. diameter; No. 4, extra hard tires, for switching, mill engine service, etc.

For grades, Nos. 1 and 2, a blacksmith test of a forged bar between 1½ in. and 2 in. wide by ½ in. thick, forged from a 3 or 4 in. test ingot, and nicked for a depth of $\frac{1}{16}$ in., shall be capable, after being heated to a dull red heat and being plunged in water at a temperature of between 60 and 80 deg. Fahr., of flying when struck with blows of a hand hammer, showing in the fracture of the steel, as well as in the flying, that the steel is markedly hardened. Similarly bars unhardened, and without the nick, shall be capable of bending under blows of a sledge hammer to 135 deg. without fracture.

Material of grades Nos. 3 and 4 shall be capable of similarly showing the "hardening test," and shall bend, in cold bending test, to at least 90 deg. before fracture.

Steel of grade No. 1, in tensile test specimens cut from the forged bars, shall have a tensile strength of 105,000 lbs. per square inch, with an elongation of at least 14 per cent. in 4 in. Steel No. 2 grade shall similarly have a tensile strength of 115,000 lbs., with an elongation of 12 per cent. in 4 in. Steel of No. 3 grade shall similarly have a tensile strength of 125,000 lbs., with an elongation of 8 per cent. in 4 in. Steel of No. 4 grade shall similarly have a tensile strength of 135,000 lbs. per square inch, with an elongation of at least 6 per cent. in 4 in. A variation is allowed of 10,000 lbs. per square inch in either direction with all the above requirements for tensile tests.

The chemical constituents of the steel of these various grades shall be as follows: Maximum phosphorus, .06 per cent.; maximum sulphur, .05 per cent. for all grades; carbon of No. 1, preferably, shall be between .50 and .60 per cent.; carbon of No. 2 grade, preferably, shall be between .60 and .70 per cent.; carbon of No. 3 grade, preferably, shall be between .65 and .75 per cent.; carbon of No. 4 grade, preferably, shall be between .75 and .85 per cent. The manganese ordinarily runs in this steel from .50 to .75 per cent.

ALFRED E. HUNT.

A Building for the Engineering Societies.

PHILADELPHIA, Jan. 17, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I venture to suggest the eminent and imminent propriety of united action by the several national and local engineering societies having their headquarters in New York, with a view to providing a building for their joint use.

Such a building would naturally form the recognized engineering headquarters not only of New York City but of America; and this consideration, together with the fact of convenience of access to the combined libraries of the societies, would cause offices in the building to be eagerly sought after by engineers of all branches, by architects, by patent attorneys, etc., and thus the building would probably become a source of revenue to the societies concerned. It is possible also that editorial rooms might be taken in the building by the various engineering and technical journals published in New York, for the advantage of being located at the seat of the engineering interest would compensate for the disadvantage, if it be one, of being further up-town than the offices at present occupied by those journals.

It would, furthermore, offer thoroughly satisfactory accommodations to each of the societies, whereas the separate buildings they now occupy at considerable expense, being in most if not in all cases merely transformed dwelling houses, are necessarily more or less unmistakable makeshifts.

One large meeting-room might be provided, and fitted with appliances for the operation of machinery on the stage, for use by the several societies on different evenings; and, on evenings when it was not so used, it could be rented for lectures or other entertainments of a suitable nature, and thus be made an additional source of revenue.

The libraries of the several societies might, with the greatest advantage to all concerned, be arranged in one large room, even if not merged into one single collection with one systematic arrangement, which would, of course, be vastly preferable and which might be consummated if the individual societies could be brought to sink their several identities to that extent.

A plan of this sort, if wisely carried out, would provide vastly better facilities for the societies and their members than they can possibly enjoy in their separate quarters, and it would greatly enhance their prestige by reason of the enormous advantages bestowed upon the profession generally. By no means the least of the advantages that would accrue would be the high degree of co-operative activity which the execution of the scheme would involve and which its successful consummation would inevitably perpetuate.

By following some such course as that adopted by the American Society of Mechanical Engineers in procuring their present house, the building could be erected without depending upon the funds of the societies or upon alms, although the properties already in the possession of the societies might also be made to contribute upon some equitable basis.

JOHN C. TRAUTWINE, JR.,
Assoc. Am. Soc. C. E.

The Nicaragua Canal.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The issue of the *Railroad Gazette* of Jan. 13 contains an article adverse to the Nicaragua Canal project. It is stated that the purpose of that article is to consider the subject without prejudice. This being so, I have no doubt you will publish as well some simple inquiries or suggestions based upon that article. While the article gives many figures, the really important part of it is what is indefinitely suggested as possible or probable, without figures being given:

The first question is why such an article has been held back and presented only at the eleventh hour, when legislators are about to act on the project. This project has been under discussion many years. The article is sprung on the public in a way calculated to excite the suspicion that full examination of it was not wanted.

You state that "officers of the Coast Survey, the army, the Geological Survey, the Ordnance Department, and also a committee of civil engineers have all examined and reported" on the project, and that no adverse report has been made except in one case where the quantities were increased (the objections raised in your article not being raised even in that one report, so far as known). Were all these officials, so widely distributed in their spheres of work, all dishonest or all incompetent?

Your writer speaks of the general soil and rock being of volcanic origin. Does he not know that such a country absorbs water like a vast sponge, and lessens the amount that is shed into the streams more than is the case with any other soil?

The great Ochoa Dam is intended merely to restrain the sudden nature of the rush of water, and is not intended necessarily to be an absolutely tight dam for use of the water. There is nothing in the mode of construction proposed which to an outside mind appears absurd. With the sharp corners of the approximately cubical form of basaltic fragments, as any one knows who has built many embankments of large pieces of it, it is difficult to get the pieces to roll over even enough to make the embankment. This is still more the case when such a piece reaches the soft bottom of a stream. The slope of the Ochoa is likely to be very much steeper than the steepest slope estimated for. As for settlement in the sand, any one who has directed the depositing of large masses of such sharp basaltic rock in rivers with sandy bottom has noticed just the action spoken of by "ordnance officer." It is similar to the settlement of weighted piles by the water jet. I recall one instance of 50,000 cubic yards of basaltic rock in such a river, where the action was just that stated. The more rapid torrents which your writer states exist at Nicaragua would hasten such action.

Your writer speaks of an immense number of embankments and waste weirs provided. Does not this indicate intelligent handling of the project?

The profile of the route is spoken of as across the watershed and on a succession of ridges. Does not this feature, unless water is to run up hill, relieve the bulk of the route of the water, and concentrate the trouble where the attention and cost can also be concentrated to meet it?

You speak of the character of the rock in the great divide cut. If your writer had had charge of much basaltic rockwork in a lava country he would know how stable such a rock often is, and at what steep slopes it would stand. Along the Columbia River are all sorts of strange peaks and isolated pinnacles of such rock, some of them 50 or more feet in height and with slopes almost vertical. The little cubes appear to have a good bed and build, like the stone in a good dry wall, and there are not the long slippery seam and tilted strata combined that stratified sedimentary rock often shows, causing slides of rock. Moreover such rock can often be taken out without blasting for not over 50 cents per cubic yard. The imagining of a huge possible prism of excavation at the great cut, when the writer himself acknowledges that rock exists there, is a bugaboo hunt of a very misleading character. We might as well take the Mt. St. Cenis tunnel project, and imagine a terrific prism from the whole mountain top as a reason for not having gone ahead with that project.

The retarding effect of restricted channels on vessels is so well known a feature of inland navigation, and so thoroughly discounted by all capitalists, that it is surprising that any writer would go to such length to prove it. Transportation that would cost only about half a mill per ton-mile in the free ocean, might readily cost two or three mills in the canal.

The very light slopes of the Suez Canal were to allow partly for the drift of sand by the wind in a dry country. So far as enlarging the canal somewhat above the proposed section, this might be done at Nicaragua. It is not a vital question.

The question of silting is important for the operating of the canal and the profitableness of the project. In a case where there is no alternate possibility except via the Horn for vessels, the urgency of the case would appear to call for struggle with it. On such a problem, it would be well to leave the solution, and an expression of an opinion on its solution, to those who had examined the ground.

This canal project is one of vital interest to the whole Pacific coast, and should not be delayed by the articles of writers who evidently have never been on the ground, in the face of so many concurring reports of honorable and competent experts in its favor.

ARCHIBALD A. SCHENCK.

[There could be no better time to get attention to a discussion of the Nicaragua Canal than when legislation is at hand. It is then a practical question, and a discussion is not merely "academic." It would certainly have been better had the technical part of the question been thrashed out and settled before the enterprise came up for financial help from the nation; but if that has not been done already, now is better than never. If we have been backward in our duty, that is all the more reason for doing it now. It is no great matter for the nation or the world if the building of the canal is delayed a year longer; it will keep. But it is a very great matter to pledge the credit of the nation to a colossal enterprise on foreign soil, without knowing and weighing all the facts. This is all we ask—that all the facts be

placed before the world, and especially before the engineers of America.

The comparison with the Mt. Cenis tunnel is bright, but misleading. A tunnel can be arched if the roof is bad, but it would be a hard job to hold loose rock on a slope of ⅛ to 1 in a 300-ft. cut; and the ability of the rock in the great divide cut to stand vertically is just one of the things not to be taken for granted. Borings have been made on the centre line at distances of 1,000 ft., but they were first made to only to a very small part of the depth of the cut. How many of them have since been carried to the full depth we do not know, or what they revealed. This is precisely what ought to be known, and if we can bring out this information one of our purposes will have been accomplished. Surely Mr. Schenck would not take a contract and give bonds to excavate the cut and make it stand on a slope of ⅛ to 1, without more knowledge of the material than is given by borings 1,000 ft. apart, sunk to one-fifth or one-fourth the total depth.

Truly, the retarding effect of restricted channels is well known, and is discounted by [some] capitalists. If it is this discounting that prevents private capital from building the Nicaragua Canal, then should we sit silent and let the nation be taxed to build it? But it is not only the delay and cost of navigating this rock channel, 80 ft. wide, with 2,400 sq. ft. section, that we wished to point out; it is the danger also. Some of those same capitalists have learned that in a canal a vessel goes down by the stern pretty fast as speed is increased; the higher the speed, the more she "squats." But when she "smells the bottom" she is hard to steer. Given these well known facts, and an 80-ft. rock channel, or the Nicaragua earth channel and curves of 5,000 ft. radius, how many ocean-going steamers will go aground, or at what speed can they pass the canal at all?

Perhaps it is as well to state our position in this matter. We object on principle to a government guaranty of anything, but admit that in certain special cases it is wise. The Nicaragua Canal case may be one of them or may not be; that we leave out of the present discussion. We simply ask that there be reasonable assurance that the sections are large enough, that the great cut can be made safe with the estimated quantities and slopes, that floods can be provided for, and that all these things can be done within the expenditure that the nation is asked to guarantee. We suggest that a commi sion of eminent engineers, civil and military and naval, be appointed to examine this subject, not only in all available documents, but on the ground, for the purpose of giving the public that assurance.—EDITOR RAILROAD GAZETTE.]

Concerning Engine Houses.

The proper location and arrangement of the engine house in connection with the general plan of a large terminal yard is a matter of daily increasing importance. The value of land in the vicinity of large cities, especially in the East, is increasing with such rapidity that the utmost economy in the use of space is requisite. The first consideration in planning a yard is usually given to the proper and economical location of the various buildings required; the arrangement of tracks being in many cases subordinate thereto.

Perhaps because the name of roundhouse has become almost a synonym for engine house, the common practice in this country in the past has been to construct engine houses on a circular or semi-circular plan. The theory has been that by locating the turntable in the centre of the circle and radiating tracks from it to the various stalls in the house, great convenience and economy of space result. The waste of land involved in this arrangement, in the immediate approaches to the roundhouse or turntable, has seldom had due consideration. Many examples exist in this country of houses of this character, placed at the entrance to large freight yards in such a way that a considerable amount of ground has been left unoccupied on either side of the roundhouse, so called. Often we see two circular houses placed side by side, with two turntables and connecting tracks, an arrangement involving the appropriation of a very large area, far in excess of the actual ground occupied either for stalls, tracks or turntables. So long as land can be bought for railroad purposes at farm prices, the possible waste of an acre or two in the vicinity of the roundhouse has not been considered of much account, and in fact has been defended on the ground that more or less space was necessary for the storage of fuel, old material, wheels, etc.; but where yards are constructed in cities when the land is bought at the price of city lots, the waste of these unoccupied areas in the vicinity of the roundhouses becomes a matter of serious consideration. It is a question in such cases whether a strict regard for economy of space would not require the construction of a house arranged in the form of a rectangle or parallelogram. It is not our purpose to present detailed comparative plans of the possible construction under these two general ideas. The circumstances of each case must control the engineer who plans the yard and will of necessity introduce infinite variety in their arrangement.

A somewhat hasty comparison of the possibilities, however, would seem to indicate that an engine house could be constructed in the form of a parallelogram, affording all requisite space between the several stalls with a result of an economy in the area of the building itself and its consequent expense of at least 25 per cent., as compared with the ordinary roundhouse. When taking into account the area of ground in front of the building that would be necessary for the several tracks leading from the main track into the stalls, of course the question immediately comes up as to the radius of the curve that would be permitted on which to run engines from the main track into the house. Assuming, for the sake of argument, that it would be necessary to adopt a radius for this curve of 285 ft., around which almost any consolidation engine can pass with ease, we should still find that the total area of the ground occupied by the approaches and the house would not exceed for the same number of stalls the total area required for a full circle house. If the radius of the approaching curves is reduced (as in many cases it could be without inconvenience), of course the amount of space occupied by the approaches to the several stalls would be correspondingly diminished. It may be given as an objection to such a plan that it would involve a greater movement of engines which it may be desired to turn before putting them into the house. But on the other hand there is a positive advantage to be gained in having the stalls connected with the main track and not dependent in any way upon the turntable. Many instances have occurred and are still occurring where the failure of a turntable—the centre casting for example—will lock up all the engines in a roundhouse for several days, causing great inconvenience in the operation of the road concerned.

The obstacle presented by the roundhouse to the proper planning of a freight yard is in many cases a serious one. If a full-circle house is required, with a capacity of, say, 44 stalls, which is not unusual, the extreme diameter of the house is upward of 300 ft. This appropriates a space equivalent in width to that required for 25 tracks, and with the inevitable waste of ground at either side involves the sacrifice of a very large area in the yard. If the roundhouse is cut in two, and two semi-circular houses placed side by side on the same line, we still have to sacrifice over 150 ft. in width of our yard, and the corresponding area required is about the same as in the case of the whole circle. A house built in form of a parallelogram, with the necessary approaches and no curves with a radius of less than than 285 ft., can be constructed without occupying more than 140 ft, in all in the width of the yard, and there will be hardly any waste at all in regard to the general plan.

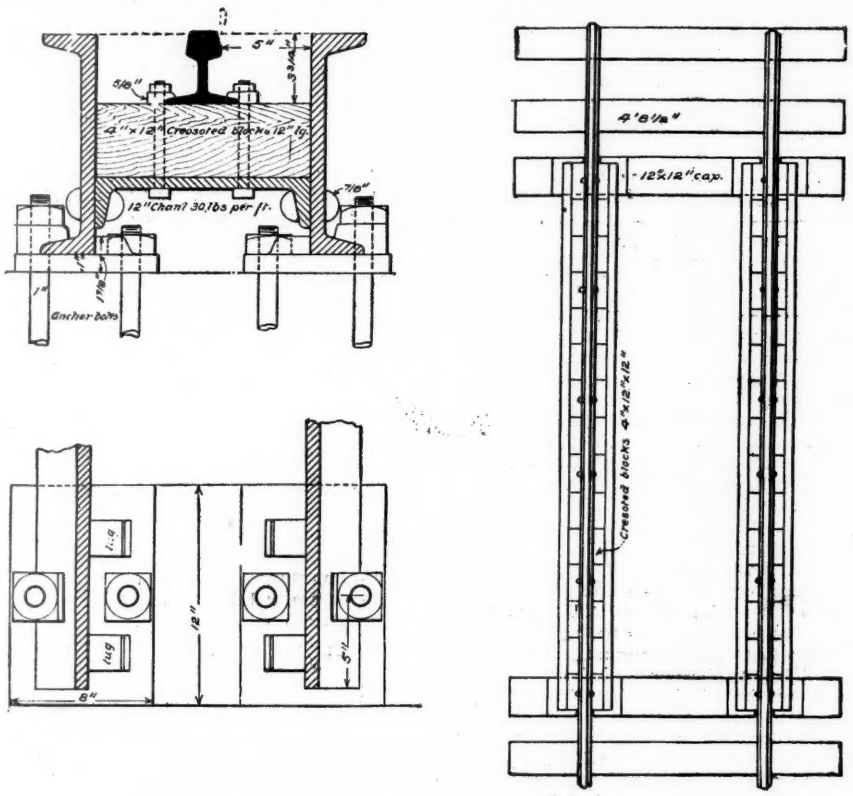
There is nothing new in the suggestions above. Examples can be found in practice both in this country and in Europe. At the same time, it is believed that not sufficient consideration has been paid to this subject and that many cases do arise in practice where a too rigid adherence to standard roundhouses involves serious waste of valuable property. In one recent case that has come under our observation land that cost a very large sum of money was absolutely squandered by an adherence to the standard form of roundhouse, when every inch of it might have been occupied to advantage had the rectangular construction above suggested been adopted. ENGINEER.

Chuck for Truck Frames, Chicago & Northwestern Railway.

The Chicago & Northwestern Railway has had in use at its West Chicago shops for a number of years a chuck for truck frames which is shown by our illustration. The chuck is in the form of a carriage which runs upon a track directly below a radial drill and a small traveling crane. The method of using the chuck is shown by the dotted lines in the side elevation. On the chuck frame are four planed rectangular pieces, which are the right distance apart for the pedestal jaws. These are each 7 in. wide, but are readily increased to 8 in. by the addition of two ½-inch liners for 8 in. truck boxes.

In using the chuck the pedestal castings are put in place, and clamped by the horizontal set screws shown. The frame is then put on top of the pedestal castings and clamped into position, and then all of the holes along one side of the frame are drilled in succession by moving the chuck along under the drill. When the holes on one side are drilled the chuck and truck frame are lifted by the small traveling crane previously referred to, and swung around, bringing the other side in line with the drill. Of course the work could be done with greater rapidity if the drill press arm was provided with two spindles. This machine has been in use for quite a number of years at the Chicago shops with very satisfactory results, as would naturally be expected.

The importance of having the axles square is generally well understood, but ordinary methods do not seem sufficient to obtain this result, as it has been found that the trucks of locomotives coming from well known builders were a much as ⅝ in. out. In the original design of this machine, which we understand is due to the late Geo. W. Tilton, it was intended to provide longitudinal and transverse adjustments which would make the chuck more readily available for trucks of different lengths and for different gauges of track. We are indebted for the drawing of this chuck to Mr. Wm. Smith, Superintendent of Motive Power, Chicago & Northwestern Railroad.



Crossing for Irrigation Ditches, Southern Pacific Company, Atlantic System, El Paso Division.

NOTE.—For 15-ft. span 12-in. channels are used, 50 lbs. per foot. The crossing here shown is for 12-ft. span, and 30-lb. channels are used.

The Proposed Standard Code for Interlocking and Block Signaling.

BY ARTHUR H. JOHNSON, *Engineer of Signals, New York, Lake Erie & Western R. R.*

The science and art of railroad signaling have come to be well understood by a number of American engineers, and although our best practice differs as regards both construction and use of signals from some of the European methods, it is almost identical with the latest practice in Great Britain. There is, however, one main feature of the science, which is not at present generally understood, nor practically carried out in this country, and that is the proper manner of conducting traffic where the interlocking and block systems are in use.

To meet this great want the American Railway Asso ciation has appointed a committee to inquire into the

aforesaid systems, and formulate a standard code of rules for the guidance of our railroads. As the English lines had to meet this matter some years ago, and have given us the result of their deliberations, in the "Rules and Regulations" agreed to by companies in the Railway Clearing House system, it would appear wise in framing our standard code to use these rules as a basis. Below are the principal rules, slightly altered to suit our phraseology and practice, but I beg to refer those who are directly interested to the "General Rules and Regulations" issued by such companies as the London & Northwestern and the Lancashire & Yorkshire to their officers and men, as it would take up too much space to publish all the rules. The reader must especially bear in mind that the wording has been changed to suit right-hand running.

1. Fixed signals are divided into four principal classes, according to their location and relation to each other, viz.: distant signals, home signals, starting or advance signals and siding signals. Any of the last three classes may be used for train orders.

2. The normal position of all line signals must be at danger. On the majority of railroads the well known semaphore signal is adopted, but other forms of signals are used by some companies.

3. The semaphore signals have arms for day and lamps for night. The signal which applies to an approaching train is on most lines made by the arm extended on the righthand side of the post as seen from the train.

4. The danger signal is shown in the daytime by the arm extending horizontally on the righthand side of the post and by the exhibition at night of a red light. A purple or other distinctive light is used by some companies for sidings, etc.

5. On those lines where the semaphore caution signal is in use for permissive blocking the permissive signal is shown in the daytime by the arm extending at 45 deg. on the righthand side of the post, and by the exhibition of a green light at night.

6 When a semaphore signal is used for permissive blocking the "clear" signal is shown in the daytime by the arm extending downwardly on the righthand side of and nearly parallel to the post, and by a white light at night.

7. Where permissive blocking is not allowed, the "clear" signal is shown in the day time by the arm extending downwardly on the righthand side of the post at an angle of about 60 deg., and by the exhibition of a white light at night. (Note.) Some lines use a red light for danger and a green light for "all clear." When a white light is shown upon a single post, in place of such red or green light, on any of those lines it must be taken as a danger signal.

Home Signals.

8. Home signals are placed at stations, junctions, sidings and signal cabins, and when at danger no train or engine must pass them except as prescribed in Rule 11. Home signals at junctions are usually so placed as to indicate by their positions the tracks to which they apply, and when there are two or more arms on the same side of a post they apply to diverging tracks generally, as follows, viz.: The top arm to the main track, or high speed route; the second arm to the diverging track most to the right; the third arm to the next diverging track in order from the right, and so on.

9. Home signals at junctions must never be passed when at danger. When a train has been stopped at a junction home signal and it is necessary to bring it under the protection of that signal before the block section in the rear is clear, the signalman may where an advance signal is provided, and that signal is at danger, lower the home signal for the train to go forward. The engineman of any train which has been thus stopped at a junction home signal must, after that signal has been lowered, go slowly forward towards the advance signal, but must not pass that signal until it shows "all clear," or until he receives a clearance card, or as provided in Rule 18.

10. Home signals at stations, sidings, and signal cabins (other than at junctions) where there are advance signals must never be passed when at danger. When a train has been stopped, or brought nearly to a stand, at such a signal, and it is necessary to bring it under the protection of the signal before the block section in advance is clear; the signalman may, if the advance signal is at danger, lower the home signal for the train to draw ahead. The engineman of any train which has been thus stopped, or brought nearly to a stand at the home signal, must, after that signal has been lowered, go slowly forward toward the advance signal, as far as the line is clear, but must not pass that signal until it is lowered, except upon receipt of a clearance card properly filled out, or as provided in Rule 18. In the case of a short train or light engine, the engineman must only proceed so far as is necessary to leave the last vehicle clear of the fouling points of other tracks, and within sight of the signalman.

11. Home signals at stations, sidings and signal cabins (other than at junctions) where advance signals are not provided must never be passed at danger, except upon receipt of a clearance card properly filled out, or as follows, viz.: When a train has been stopped or brought nearly to a stand at the home signal, and it is necessary to bring it under the protection of said signal before the block section in advance is clear, the engineman must upon receiving verbal instruction from the signalman, draw past the home signal so as to bring his train well under its protection. Enginemen must not go forward until they clearly understood the verbal communication which the signalman has made to them, as to the state of the line ahead, and then only with their engines under needful control to insure safety.

11*a*. Signalmen must be extremely careful not to lower the home signal for an approaching train which has to stop at the advance signal until the train is close to the home signal and has been brought nearly to a stand at it. In foggy weather, or during falling snow, enginemen must when practicable be verbally informed that they are only to draw forward to the advance signal.

An advance signal must not be passed at danger except upon receipt of a clearance card properly filled out, or as provided for in Rule 18. In case of detention at a home signal, the engineman must sound his whistle, and if still detained the conductor or fireman must go to the signal cabin and remind the signalman of the position of the train or engine. The same arrangement must be carried out when an engine or train is standing on the main track waiting to cross onto another track. Sufficient time must be allowed for the conductor or fireman to rejoin his train before the signals are lowered.

12. When a home signal has been lowered for the passage of a train it must not (except in case of accident or obstruction) be again placed at danger until the last car of the train has passed it, or the train has been brought to a stand; nor in the case of a junction until the last vehicle of a train has passed it and is clear of the junction points.

Distant Signals.

13. Distant signals are placed at a considerable distance from the home signals. They are constructed to exhibit the danger and "all clear" signals, and the arms are forked to distinguish them from home signals. When it is found necessary to place the distant signal arm of a cabin in advance on the home or advance signal post of the cabin in rear, the distant signal is the lower, and the home or starting signal is the upper arm of that post.

14. Distant signals must be placed at danger immediately they are passed by a train or engine, and must not where block working is in operation be again cleared until another train or engine is signalled as entering the block section and both rear and advance sections are clear. They must be also placed at danger whenever any obstruction or danger exists upon the track they are intended to protect, and the danger signal must remain exhibited until the obstruction or danger is removed.

15. Whenever the distant signal is at danger, the danger signal must be exhibited at the home signal, except when a train has passed the distant signal at danger, or in the case of an approaching train, for which both the signals have to be cleared. In the latter case the home signal must be cleared first, and the distant signal placed at danger as soon as the train has passed it, and in the former case the home signal only must be lowered to allow the train to pass.

16. When an engineman finds a distant signal at danger he must shut off steam before passing such signal, and bring his train under complete control, so as to be able to stop before reaching the home signal and must bring his train to a stand as near the home signal as the circumstances of the case will allow.

17. When an engineman finds a distant signal at "all clear" he may take it for granted that both home and advance signals also simultaneously exhibit the "all clear" signal. He must, however, although thereby allowed to proceed at speed, keep a sharp lookout on the home and advance signals, as circumstances might arise at the last moment which would cause the signalman to reverse the signals in the face of the train in order to prevent an accident.

Advance Signals.

18. When advance signals are used they are intended to control the departure of trains into the block section ahead, and must never be passed when at danger except as follows, viz.: (1) Upon receipt of a clearance card properly filled out. (2) When the switches of sidings or cross-overs are so near to an advance signal as to render it necessary for the signal to be passed for drilling purposes, enginemen may, for the purpose of performing such operations, pass the advance signal when at danger upon being directed to do so by the signalman.

General Rules.

19. Distant, Home and Advance signals apply only to trains running in the proper direction on the main line, and must not be used for any other purpose. Trains or engines running in the wrong direction must be signaled by hand, lamp or flag unless wrong track signals are provided. Trains or engines shifting from one main line to another or shifting into or out of sidings connected with the main line must, unless fixed signals are provided for the purpose of signaling such operations, be signaled verbally or by hand, lamp or flag, as occasion may require, it being necessary in such cases that the danger signal shall be exhibited at the home, as well as at the distant signal, for the protection of trains or engines so employed.

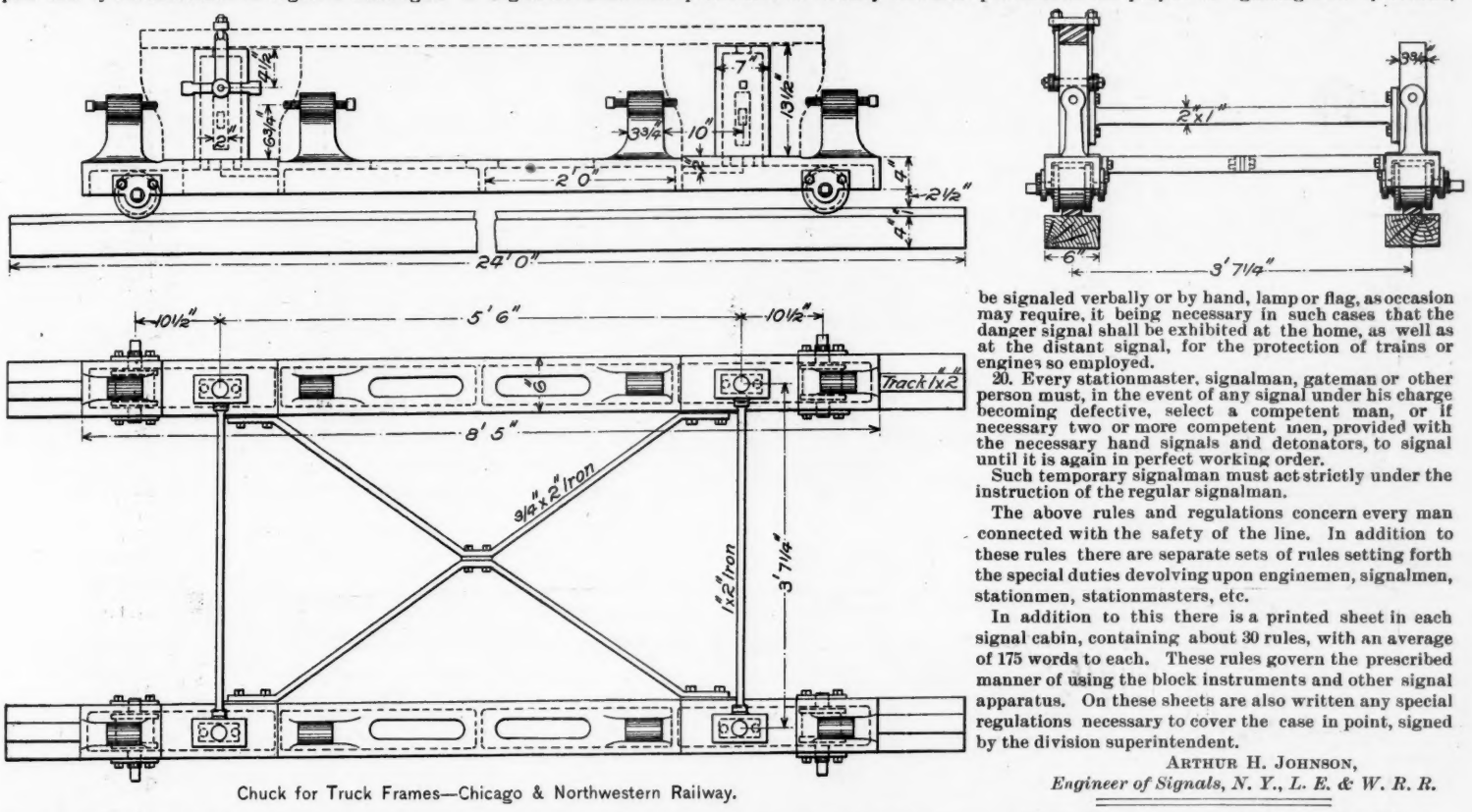
20. Every stationmaster, signalman, gateman or other person must, in the event of any signal under his charge becoming defective, select a competent man, or if necessary two or more competent men, provided with the necessary hand signals and detonators, to signal until it is again in perfect working order.

Such temporary signalman must act strictly under the instruction of the regular signalman.

The above rules and regulations concern every man connected with the safety of the line. In addition to these rules there are separate sets of rules setting forth the special duties devolving upon enginemen, signalmen, stationmen, stationmasters, etc.

In addition to this there is a printed sheet in each signal cabin, containing about 30 rules, with an average of 175 words to each. These rules govern the prescribed manner of using the block instruments and other signal apparatus. On these sheets are also written any special regulations necessary to cover the case in point, signed by the division superintendent.

ARTHUR H. JOHNSON,
Engineer of Signals, N. Y., L. E. & W. R. R.



Chuck for Truck Frames—Chicago & Northwestern Railway.

Track Maintenance with Metal Cross-Ties.

The relative costs of track maintenance with metal and with wooden cross-ties was one of the subjects which came up for discussion at the International Congress at St. Petersburg. The various contributions to this subject made by different railroad companies which employed both kinds of ties showed a saving in cost of track repairs and maintenance in favor of the metal ties of something like 30 per cent. This was the average on 17 lines where 6,731 kilometres was laid with wooden ties and 287 with metal. The returns received were from roads on which the two kinds of ties were used on practically parallel sections, so that the results were comparable.

With regard to the French State Railroad, reference was first made to the section between Chartres and Paris, on which were used 7,848 oak ties in their natural condition—that is, not treated by any preservative process; 7,848 metal cross-ties of variable cross section; and 7,750 metal cross-ties of uniform cross section. All these ties were used under the same conditions of location, character of line, traffic, etc.; and for the variable section metal ties the saving in cost of track maintenance, as compared with the cost of track laid on the wooden ties, represented about 12 per cent. during the first year, 24½ per cent. during the second year, and 40 per cent. during the third year.

On the Algerian system of the Paris, Lyons & Mediterranean Railroad, observations had been made on 370,000 wooden cross-ties, one-tenth of which were of pine, treated with sulphate of copper, and the other nine-tenths consisted of untreated oak; 85,357 iron cross-ties of the old type of Vautherin, and 90,686 steel cross-ties of the Hilf type. These three principal types of tie were used under practically the same conditions, and the results, as reported, showed a saving in the matter of maintenance of 34 per cent. in favor of the metal ties. M. A. M. Korvalski, of the Bône-Guelma

road, reported a saving by metal cross-ties, shown by observation on a 14 kilometre section of road of exceptionally troublesome character, of 26 per cent.

The conclusion arrived at in 1885, at the Brussels Congress, was that, from a technical point of view, wooden and metal cross-ties were practically equal in value, but there was no definite information available as to the cost of track repairs and maintenance when using the two kinds of ties. In the absence of proof to the contrary, therefore, those favoring wooden ties strongly pressed the claim that the expenses of maintenance were rather increased than diminished by metal cross-ties. Accordingly, it is of interest to note that at the St. Petersburg Congress this claim was disposed of by the adopted resolution that "the metal cross-tie, when laid down under rational conditions of use, produces an economy in the expenses of maintenance," it being pointed out that due regard for "rational conditions of use" called for a judicious taking into account of weight and cross-section of the tie, with special reference to the character of the traffic, such as train-speeds and weights, the nature of the road ballast, etc.

M. Korvalski is said to have deduced, from his experience on the Algerian branch of the Paris, Lyons & Mediterranean road, that, assuming a life of 30 years for a metal cross-tie and a life of 10 years for a wooden cross-tie, and allowing 1,200 cross-ties to the kilometre, there would be a saving at the end of 30 years of about 46,000 francs for each kilometre of track in favor of the metal ties.

The St. Gall & Gais Mountain Railroad.*

The St. Gall & Gais is one of the many Swiss mountain railroads, worked both by adhesion and rack, that have been built within the last few years, but it is especially interesting on account of several features in the design of permanent way and rolling stock. The determining conditions were imposed by adopting a typical Alpine carriage road for the line of the railroad, which is a metre-gauge line laid alongside the high road. It has gradients in several sections exceeding nine per cent. and is very crooked, so that the combined adhesion and rack system was adopted and especially constructed locomotives and cars with flexible wheel base.

From St. Gall, in the canton of the same name, to Gais, situated 808 ft. above it, in the canton of Appenzell, the railroad is 14 kilometres long. Soon after leaving the former terminus the road winds up a steep slope on its own embankments, 33 ft. high, on a 9.2 per cent. grade, and with a semi-circular curve of 98.4 radius, a curve so sharp that the locomotive seen from the rear of a five-car train is at right angles to it. After this remarkable section, which is so far unique in rack railroad practice, the line joins the high road, and with the exception of two short deviations closely follows its windings and its gradients, which range from one to nine per cent. In order to do this the roadway had to be widened an average of about 6.5 ft., which was done either by running a retaining wall under the existing slope or by excavation on the opposite side; 124 culverts and seven bridges from 5 ft. to 45 ft. in length had to be widened also. No little trouble and expense was experienced in the two years of construction from land slips. In the 14 kilometres of road going up about 2,5 is fall, 11.05 rise and nearly .9 level ground.

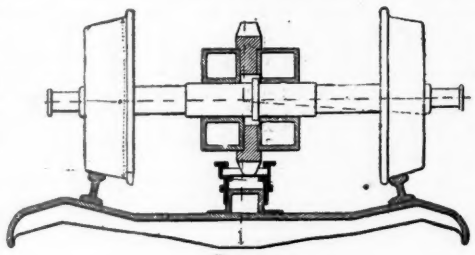


Fig. 1.

Racks are used on all grades over 4.8 per cent., which are laid on one-quarter of the line, and this length is spread over five sections, the shortest being 318 ft. and the longest 3,969 ft. The curvature represents 39 per cent. of the length, and out of 136 curves no less than 98 have radii between 98 ft. and 325 ft. The sum of all curves is over 10 circles. The superelevation on curves and widening of gauge were carefully calculated for the authorized speeds (which are 16 miles an hour on adhesion sections, 12 miles in villages and on heavy curves, and 10 miles on rack sections), and often amount to 7.4 in. and 3 3 in. respectively in the sharpest curves. There are also 20 parabolic easements from tangents to curves. There are no intermediate level sections between rising and falling grades, and the changes of grade are only rounded off approximately.

The road, which has nine stopping places, was opened in October, 1889, and has been worked with profit, both summer and winter, ever since. An interesting feature of the operation is that, in common with other Swiss local lines, the telephone is used entirely in place of the telegraph, with success and economy, its first cost being less and it does not require a specially trained staff.

The rails are 51.2 lbs. per yard, of the Vignolles type. They are 29.5 ft. long. The cross ties are spaced 2.72 ft. apart, 11 to each rail. The metallic ties are of the Hilf type, curved at the ends with an inclination of 1 in 8 toward the middle, a feature necessitated by the exceptional curvature, superelevation and widening of the gauge. At the middle the section is considerably narrowed and deepened, like the well known Post tie. The fishplates for the joints, which are suspended over the clamps and bolts by which the rail is fastened to the tie, are shown in Fig. 2.

The rack used is a modification by Messrs. Klose and Bissinger of the Riggenbach ladder type. The modifications are that, instead of every tooth being riveted to the rack girders, as shown in fig. 3, out of the 45 which go to a rack length of 14 ft. 9 in., only every ninth one is so riveted, the others fitting with their circular ends into sockets, and are supported by outside brackets so that they cannot move, but can be more easily taken out and replaced. The rack girders do not rest on but are bolted to the chairs, an arrangement which, it is claimed, does not impair the rigidity of the rack. The outside flange angle is thickened to protect the flanges from being weakened by the grazing of the pinion wheels which have lateral play. In sharp curves the teeth are set radially. The rack joints are bolted and alternately suspended and supported. The chairs to which the rack is bolted have vertical wings which clasp the side of the cross tie and are fastened to it by two pins.

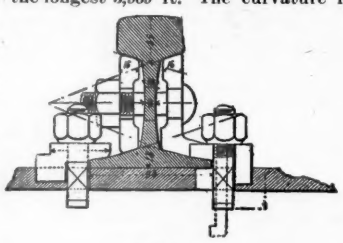


Fig. 2.

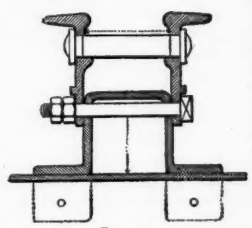


Fig. 3.

The passage from adhesion to rack sections is effected by a seven-ft. rack length laid on a grade not exceeding two per cent. and hinged to the continuous rack. It rests on spiral springs.

The cost of construction was per mile:

Land and compensation for widening road	$5,780
Earth works, etc	9,710
Permanent way (8.75 miles, including sidings)	8,000
Rack (2.1 miles)	10,700

The six-wheeled cars are 25.5 ft. long with a 14.76 wheel

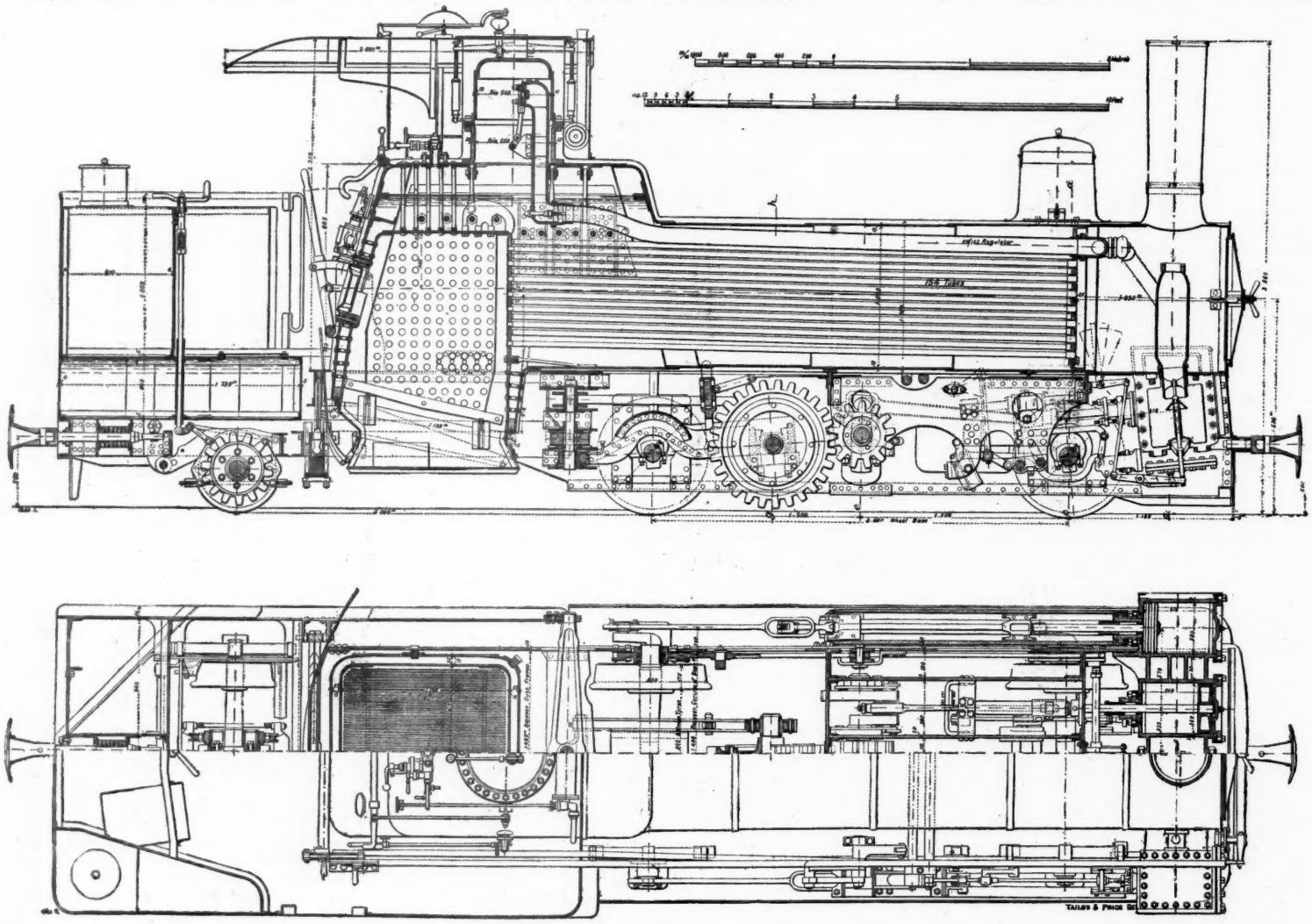


Fig. 4.

ENGINES OF THE ST. GALL & GAIS RAILROAD.

* Extract from a paper by C. S. du Riche Preller in *Engineering*.

base. They have much flexibility in the two end axles, obtained by a system of lever bars which regulate radial play, and a radial play of 2.15 in. is given to the central axle which also carries a pinion with a lateral play of 1.7 in. The tread of the tire is 6.87 in.

There is a brake on the last axle of each vehicle, and the centre pinion axle is fitted with two brake discs, one on each side of the pinion wheel, each acted on by two blocks.

The locomotives, also especially designed, weigh 32.5 and 34.6 tons. The features of these locomotives are pretty well shown in the engravings. It will be seen that there are two pairs of adhesion wheels; these are driven by the outside cylinders. The pinion wheel is driven by the inside cylinders. The connecting rods to the adhesion wheels consist each of two parts with flexible joints. The pinion wheel and axle also have lateral play. Under the tank is an axle fitted with a pinion wheel which is acted on by brake discs. The outside and inside cylinders are all 14.16 × 20.04 in. and may be worked either separately or compound. As a rule they are worked compound, the steam passing from the adhesion to the pinion cylinders. The boiler pressure is 176.4 lbs. per square inch.

The locomotive is fitted with three kinds of brakes; the Riggenbach air brake, used on rack sections, acting on all four cylinders; two screw brakes, one acting by means of shoes on the adhesion wheels, the other on the disc fitted to the pinion trailing axle; for the whole train a Klose continuous compound air brake worked at a pressure of 88 lbs. per square inch.

Owing to the up and down gradients the boiler is placed horizontal. The performances of these locomotives, the two types of which cost $10,600 and $13,400 respectively, have been satisfactory, exerting under the most difficult conditions of work a tractive force equal to one quarter their own weight. The ease and smoothness with which the locomotive and cars pass through the sharp reverse curves is said to be remarkable.

Clearance-Measuring Car, Pennsylvania Railroad.

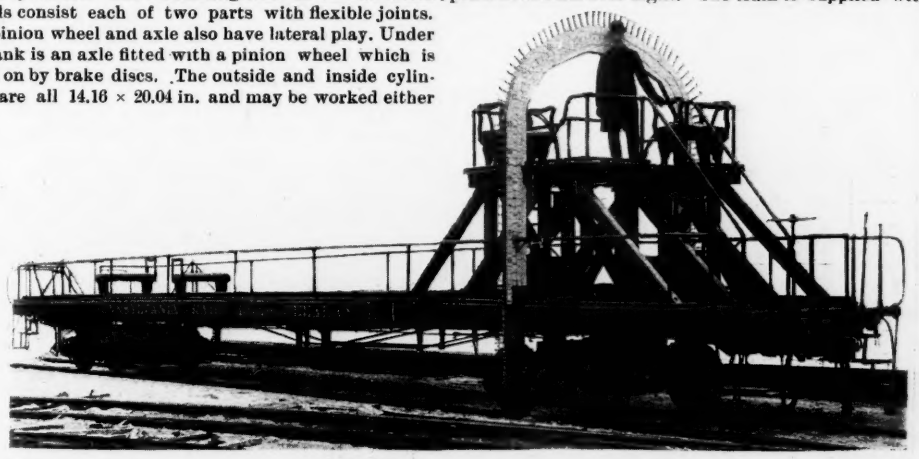
The accompanying engravings show a front and a side view of a car recently built by the Pennsylvania Railroad for the use of a party from the Chief Engineer's office who went over the whole road for the purpose of obtaining absolutely correct records of all tunnel and bridge openings, and the precise relation to the track of all other structures likely to become obstructions to passing trains. A very good record of this kind is already kept by the Chief Engineer, but the approach of the World's Fair at Chicago has brought so many inquiries from all quarters of the globe relative to the transportation of merchandise of unusual shapes and magnitudes that it was deemed advisable to make an entire revision.

At one end of the car there is erected a second floor or platform, about 5 ft. above the main floor, and about 9 ft. square. Both floors and the two stairways leading to the upper one are protected by substantial iron railings. Over this platform and directly over the centre of the truck is placed the template, from which measurements are made with measuring sticks and foot rules in all directions. To facilitate the keeping of the notes, the recorders have lithograph fac-similes of the face of the template on which the notes can be kept and the obstruction sketched when desired.

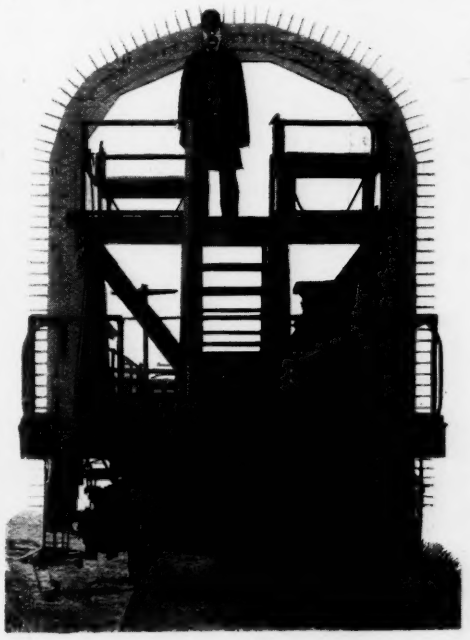
The template was carefully constructed with its perimeter or outline based on the existing records, and its size is as great as it was deemed safe to make it. Both its faces are graduated every 3 in. from the line of the top of the rail to an elevation of 15 ft. above the same, and the main divisions plainly marked with figures that are legible in almost any light. At an elevation of about 9½ ft. the template is jointed with a pin and eye hinge, which, with a clamp screw on the inner side, moving in a semi-circular slot, allows the upper portion of the template if it strikes an unexpected obstruction to ride over and down until it rests on the iron railing, thus avoiding all possibility of accident to that portion of the frame.

To protect that part between the floor and the top of the rail the template was divided at the level of the car floor, and a chain was run through the lower portion to hold it suspended if knocked off by any obstruction, to prevent its being thrown under the wheels; and a supply of duplicates of this lower portion is carried on the car. Around the entire length of the perimeter there is a series of light strips or withes set about 3 in. apart and projecting 6 in. from the edge of the template. The object of these is to prevent all possibility of passing any close obstruction in tunnels when the vision may be obscured by smoke or steam. This simple attachment has proved a valuable one.

The "clearance train" when in operation is made up of a locomotive followed by the clearance car, next to which comes the car in which the party in charge are housed and fed, and, last of all, the electric light car, from which the platform on the clearance car is illuminated by means of ten incandescent lights of 65 candle power each. This gives ample light for working in tunnels, and allows operations to be continued into the evening, when it is necessary to reach a suitable place to remain over night. The train is supplied with air brake and steam pipes. It has already traversed fully three-fourths of the entire Pennsylvania lines east of Pittsburgh and Erie.



Clearance Measuring Car—Pennsylvania Railroad.



Pennsylvania Clearance Car.

American Society of Civil Engineers.

The Annual Meeting of the American Society of Civil Engineers was held in New York beginning Wednesday morning, the 18th. The business of the meeting was finished by 1 o'clock, leaving the afternoon free for social matters and the evening for Mr. Kelly's paper on the Intercontinental Railroad, which was set down in the programme. Thursday was given to an excursion, as has been announced, and Thursday evening there was a reception and collation at the house of the Society.

At the business meeting Wednesday morning the report of the Board of Direction was presented. The total membership is 1,644, of whom 1,506 are non-resident members and the others resident, in the various classes. The net gain for the year was 108. One-hundred and seventy-one applications for membership were acted on during the year and 18 wait the action of the Board. Two Past Presidents died during the year, Mr. James B. Francis and Mr. William R. Shinn.

The amount expended on the library during the year was $612 and the additions, including pamphlets and specifications, were 1,093 pieces. The receipts during the year, including the balance of $5,661 on hand, were $39,700 and the disbursements $35,098.

The Norman medal was awarded to Mr. William Starling for his paper on the Holland Dikes. An extended abstract of this paper appeared in the *Railroad Gazette* of Nov. 11. The Rowland medal was awarded to Messrs. Samuel M. Rowe, Stillman W. Robinson and Henry M. Quimby for the paper on the Red Rock Cantilever Bridge. The Committee made honorable mention of the paper on Inland Sewage Disposal, with special reference to East Orange, by Mr. C. P. Bassett; the paper on American Irrigation Engineering, by Mr. H. M. Wilson; and the paper on the Brazos River Harbor Improvements, by Mr. G. Y. Wisner.

On the question of the badge of the Society the Board recommended that a circular be sent out to members to get criticisms, opinions and suggestions as to a new badge. This recommendation was approved by the Society.

On the method of appointing the Nominating Committee the Board of Direction made the following recommendations, which were adopted.

The Board of Direction, in compliance with the request of the last annual convention that it should report to the annual meeting a plan for effecting the selection of the Nominating Committee, recommends the following:

First.—At its March meeting in each year the Board of Direction shall divide the territory occupied by the membership of the Society into seven geographical districts, each of which shall contain, as nearly as may be practicable, an equal number of corporate members of the Society; and shall recommend to the business meeting of the annual convention that the Nominating Committee shall be made up of one corporate member from each of said geographical districts.

Second.—The business meeting of the annual convention shall meet on the second day of the convention, and, after transacting such business as may come before it, shall hold an adjourned session at a stated hour of a day before the date fixed for the close of the convention. At this first session of the business meeting, the geographical districts previously established by the Board of Direction shall be announced, and the corporate members present shall be requested to assemble by districts and agree upon the names of two corporate members, either of whom will be, if elected by the convention, a proper and suitable member of the nominating committee. To facilitate the assembling and organization of such district meetings, the President shall name from the corporate members present at the convention from each district one who shall act as temporary chairman at the meeting of his district, and the Secretary shall turn over to such temporary chairman any communications he may have received from corporate members of that district relating to the appointment of a member of the nominating committee.

Each temporary chairman thus appointed shall call a meeting of the corporate members present from his district, and at each of the said meetings the names of two corporate members of the respective districts shall be chosen as suitable persons, either of whom is presented as an acceptable member of the nominating committee; and the chairman of the district meetings shall notify the Secretary of the Society of the act on taken.

Provided, however, that if it be found that any district is represented at the convention by less than five corporate members present, such district meeting shall make no nomination for membership in the nominating committee, but shall, through its chairman, report the fact to the Secretary; and the chairman shall return to the latter any communications he may have received bearing upon the question, which communications shall be presented to the convention.

Third.—At the adjourned session of the business meeting of the Convention the nominations presented by the several district meetings shall be announced, and the meeting shall proceed to elect by written ballot one corporate member from each district, as a member of the nominating committee. A majority of the ballots cast shall be necessary to a choice.

Fourth.—The Secretary shall, at least 30 days before the meeting of the annual convention, mail to each corporate member of the Society a circular calling attention to the method hereby recommended for selecting the nominating committee and requesting him to confer with such of his fellow members in his own district as he may conveniently reach; and either to be present at the convention or to communicate to the Secretary for himself, or for them, the names of two corporate members in his district whom he or they would prefer to present to the convention as candidates of their district for members of the nominating committee. Communications received in reply thereto shall be handed by the Secretary to the temporary chairman of the district meeting of the convention.

The association of members of the Society at Cincinnati recommended that some action be set on foot with regard to determining whether or not it is the sense of the Society that a code of ethics for the engineering profession should be established. After considerable discussion of this subject a resolution was adopted, the purport of which was to request the Board of Direction to consider and report upon the appointment of a committee which shall ascertain the views of the Society on the subject, and which shall formulate a code of ethics to be submitted to the Society if it seems to be the sense of that body that such steps should be taken.

The Committee on Standard Rail Section reported, through its Secretary, Mr. R. W. Hunt, that its report is completed and is in the hands of the Secretary, but is not in shape for presentation to the Society. It will be presented at some early monthly meeting.

The Committee on Impurities of Domestic Water Supply made a report, the substance of which was that the matter is too large and complicated for the Society to deal with, especially as it is being investigated continually by other bodies. Therefore the Committee asked to be discharged from further consideration of the subject; this was done. The other standing Committees made no reports.

During the session a communication was read offering the use of the Engineers' Club to the members of the Society during the Annual Meeting. A communication was read from Mr. J. A. L. Waddell covering one from Mr. Porter, asking the attention of the Society to the matter of improving the status of the engineering profession, which Mr. Porter presented to the American Society of Mechanical Engineers at the last convention of that body.

On the recommendation of the Board it was voted that the Annual Convention next summer shall be held at Chicago toward the end of July.

The canvass of ballots for officers resulted as follows:

President, William Metcalf, Pittsburgh, Pa.; Vice-Presidents, to serve two years, Elmer L. Corthell, Chicago, Ill.; Charles Macdonald, New York City; Directors, to serve three years, J. Foster Crowell, New York City, Henry G. Prout, New York City, Willard S. Pope, Detroit, Mich., Frederic P. Stearns, Boston, Mass., John T. Fanning, Minneapolis, Minn., Olin H. Landreth, Nashville, Tenn.; Secretary, Francis Collingwood, New York City; Treasurer, John Bogart, New York City.

Steel Underframe for Tank Car.

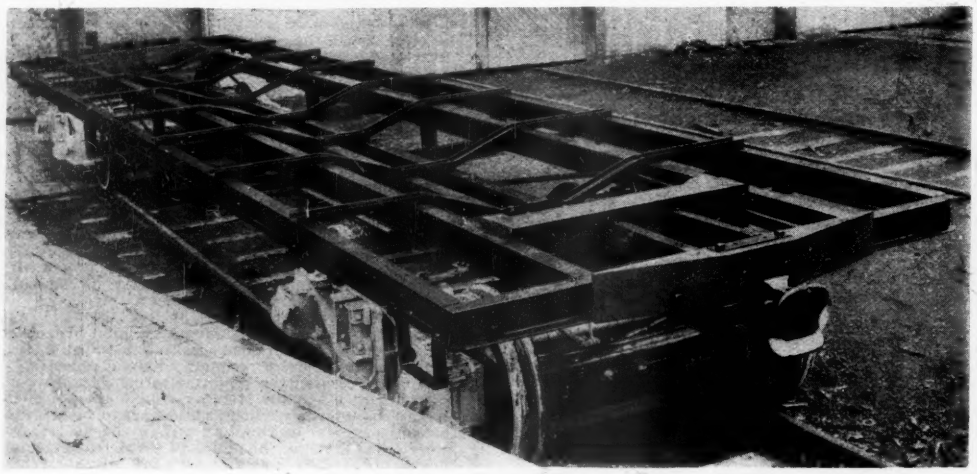
We published weeks ago drawings and description of the new design of steel frame for a tank car made by the Harvey Steel Car & Repair Works. The completed frame is shown in the illustration, which is given herewith, more clearly than it was shown in the engravings which we published last week. This illustration is made from a photograph which we did not receive until after the former article was published. It shows how the parts are assembled, more particularly the tank saddles and end stops, and the corner joint of the I-beam sills. The weight of the car as shown here is 19,900 lbs. without the tank, but including the trucks.

A System of Transfer Accounts for Railroad Supplies.

A system of accounts for keeping track of the stock on hand at different shops and for making transfers in cases where an excess exists has been in use on one of the leading railroad lines for some time with very satisfactory results. In each storeroom bins for the different classes of materials kept in stock are provided, and on each bin a card is fastened of the form shown by blank No. 1. On this card the man in charge of the stores inserts the amount received and expended from time to time and also the total. Each month a report is made out on a blank of the form shown by No. 2, but including many more items than we have shown, as nuts, nails, etc. Each foreman in charge of material makes out one of these reports monthly and forwards it to the storekeeper, who prepares a surplus sheet which is forwarded to the Master Mechanic for approval and is then sent to the office of the Superintendent of Motive Power. The requisitions by Master Mechanics are based upon the amount of each kind of material on hand and on the expenditure during previous months. The form of blank used for surplus material is shown by No. 3, on which the numbers at the head of the columns refer to the different departments in which the material is placed, as for example: No. 1, storeroom; No. 2, machine shop; No. 3, smith shop, etc.

When requisitions on the Purchasing Agent are received in the office of the Superintendent of Motive Power they are examined in connection with the surplus sheets (Form No. 3), and when material can be supplied by sending from one shop to another, this is done and such material is canceled from the regular requisition on the Purchasing Agent. A summary of material on hand at the various shops is compiled on a form such as shown by No. 4, which gives the value of the material on hand at each shop on the system and finally a total for all the shops on the system.

When it was proposed to introduce this method of keeping accounts the objection was raised that it would require additional help in the storerooms and additional clerical force. But it was found by making slight changes in the men detailed for storeroom duty, that the cards and blanks could be properly filled out without difficulty and without employing additional men. The cards used on the bins can be arranged to last a year without renewal. The entries on the cards are made in pencil, and the different detailed entries can be erased when the space has become filled and the total consumption and purchases to that time inserted and the card used as before. The monthly consumption and the balance of stock on hand is readily determined from these cards, and, as already stated, the estimated consumption for the following month is based on the average consumption of previous months as shown by the cards.



Steel Frame for Tank Car.

FORM NO. 2.

Report of Stock on hand at ..... Shops, on the ..... day of ..... 189....

The Kind and Quantity of Material to be returned in the Column, "Special Stock Limit," will be designated by the Mas'er Mechanic.

Items.	How Returned.	On Hand.	Due on Requisition.	Total.	Special Stock Limit.	Balance.	Requirements. Ordinary. For one Month.	Ordinary. Limit in Weeks.	Total Ordinary.	Special for one Month.	Total Requirements.	To be Ordered.	Surplus.	Remarks.
Account No. 19.														
Iron, ⅝ in round	Pcs.	1,000	500	1,500	500	1,000	1,000	4	1,000	....	1,000	1,000	.....	
" ¾ " "	Lbs.	20,000	1,000	21,000	....	21,000	15,000	4	15,000	500	15,500	.....	5,500	
" ⅞ " "	"	10,000	5,000	15,000	....	15,000	12,000	6	18,000	....	18,000	21,000	.....	
" 1 " "	"	15,000	.....	15,000	....	15,000	16,000	4	16,000	....	17,000	17.000	.....	
Account No. 22.														
Lumber, different kinds and sizes														

FORM NO 1.

Iron, Round. ¾ inch.

On hand.	Added to stock.	Total.	Month.	Removed from stock.	Total.
Jan. 1. 200	20, 30, 40, 60, 80	430	Jan.	40, 60, 10, 8 20, 30, 60, 20, 100	348
Feb. 1. 82	200, 100, 300, 100	782	Feb.	82, 100, 50, 50, 100, 200, 100	682
Mch. 1. 100					

FORM NO. 3.

Abstract of Surplus Material at ..... Shops..... 189.

Items.	How returned	Quantity Returned by Each Department. No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No 10	Total	Remarks
Account No. 19 Iron ¾ in., K 5	Lbs.			5,500								5,500	

FORM NO. 4.

Statement of Material on hand at Shops Nov. 1, 1892.

	Accounts.	Balance on hand Oct. 1, 1892.	Receiv'd in October.	Charged out in October.	On hand Nov. 1, 1892.
A Shop.	Air and driver brake material	$3,340.66	$722.22	$664.15	$3,398.73
	Axles				
	Castings				
	Copper				
	Flues and safe ends				
	Hardware				
	Brass and bronze				
	Iron				
	Lumber				
	Miscellaneous... Shop orders				
	Miscellaneous... Bills receivable				
	Miscellaneous... Material				
	Nails				
	Nuts				
	Oil, tallow and waste				
	Paints				
	Rivets				
	Springs				
	Steel				
	Scrap				
	Tires				
	Tools				
	Wheels				
	Total				
B Shop.	Air and driver brake material				
	Axles				
	Castings				
	Etc				

One month's supply of material is kept on hand, when purchased material can be received within one month after ordering. When it requires longer than one month to receive certain material a sufficient stock is kept on hand to cover the time it takes to receive the new lot.

This system not only has the advantage of giving the Superintendent of Motive Power exact information as to the quantity and value of the material on hand at each and all the shops on the road at any time, but has also been productive of a large saving in the value of the material which it is found necessary to keep on hand, by reason of the transfers. On the system of railroad on which this method has been in use for some time, it was found that the value of the material which it was necessary to keep on hand could be reduced from about $1,000,000 to about $650,000. The interest on $350,000 was therefore saved by the adoption of this method of keeping account.

Railroad Commissioners' Reports.

WISCONSIN.

Railroad Commissioner Thomas Thompson, of Wisconsin, has just issued the fifth biennial report of that office, covering the affairs of the department since Jan. 8, 1890. The tabulated reports are up to June 30, 1892. The length of road in Wisconsin on that date was 5,785 miles, an increase in two years of 310 miles. The two lines between Chicago and Milwaukee are both to be made double track within a few months, the work being now well advanced. The amount of license fees received from railroads during the fiscal year was $1,220,675, and from sleeping car companies $1,215. The Chicago, Milwaukee & St. Paul runs its own sleeping cars, and the tax upon the earnings of these, $2,146, apparently is included in the amount received from railroad companies. The casualties for the year ending June 30, 1892, wereas follows:

	Killed.	Injured.
Passengers	8	45
Employés	62	406
Trespassers	90	37
Not trespassing	19	23
Total	179	511

The Commissioner wants the legislature to memoralize Congress to compel the use of automatic couplers and air brakes. The Commissioner has inspected the roads of the State as well as he could by riding over them. He says the roadbed and equipment on the great through routes are equal to any in the country.

MICHIGAN.

Railroad Commissioner Charles R. Whitman, of Michigan, has issued the 20th annual report of that office for the year ending Dec. 31, 1891. It is dated Nov, 22, 1892. The delay in issuing is in consequence of the long time allowed the roads to send in their reports. In consequence of this delay the present report includes the notes of inspection of railroads made by the Commissioner in 1892. He reports many small trestle bridges and wooden culverts filled up and iron or tile culverts substituted. The report contains notes on each of the principal roads. The Michigan Central has 80-lb. rails all the way from Detroit to Niles and a good many west of Niles. The entire roadbed has been newly ballasted within the past three years, and is in "an absolutely perfect condition." This is supplemented by equally strong praise of other features of the road. From our own observation of the Michigan Central we judge that the truth of these utterances is also "absolutely perfect," but the easy way in which every road is praised tends to weaken the Commissioner's commendation, nevertheless; it is too wholesale.

The sleeping car companies doing business in the state escape taxes entirely, and the Commissioner recommends that the Pennsylvania law, which is believed to be effective, should be enacted in Michigan, so as to make these companies bear their proper share of the public burdens. Various recommendations made in former reports about grade crossings and the removal of their dangers, the inspection of stations, use of railroads as highways by pedestrians, etc., are repeated.

The length of road in the state at the end of 1891 was 7,275 miles, an increase over 1890 of 340 miles. The length of bridges in the state is 339,125 ft., of which 262,754 ft. consists of trestles, and only about 25,000 ft. of iron bridges. Of the 36 new bridges built during the period reported upon, 29 were of wood and only six of iron or stone. The number of interlocking switch and signal plants in the state is 75. The number of stations

in Michigan is 1,489, equal to one for each 4.9 miles of line. The casualities during 1891 were:

	Killed.	Injured.
Passengers	5	47
Employés	52	356
Others	118	112
Total	175	515

The taxes assessed against railroads for the year ending Dec. 31, 1891, and payable July 1, 1892, aggregated $854,334, an increase of 5.08 per cent. over the previous year. The plate from which the state railroad map is printed has been corrected to date. We do not find any copy of this map with the report.

The Substitution of Steel for Iron in the Construction of Rolling Stock.

The New England Railroad Club held a meeting on Jan. 11, the President, Mr. F. M. Twombly (Old Colony), in the chair. Mr. George Richards read a paper on Steel vs. Iron.

After referring to the long period during which iron had been used, he agreed that steel casting were very much superior to iron castings, in many cases even superseding forgings. Driving-wheel centres of cast iron frequently break, while cast-steel are far stronger and little liable to flaws. Letters from many prominent steamship and railroad corporations show that steel castings are being very extensively used.

Mr. KENT: Will steel weld as well as good iron? Will steel coupling links weld as well as iron ones with one process?

Mr. RICHARDS: The welding of steel has been long known; any metal if heated to a certain temperature, the metal being clean, will unite perfectly. The failure of welds, especially with iron, is owing to the metal not being entirely clean and clear.

Mr. CHAMBERLAIN: Would it be practicable in welding steel on a large scale to work it as wrought iron is worked, at slight additional cost, say to turn out a thousand tons of coupling links a day?

Mr. RICHARDS: If coupling links could be made without a weld it would be a great improvement. Steel is forced into use rapidly where it is practicable to cut out articles in a single piece. Avoid welding where possible, especially in steel bridge building, as a weld may be sound outside and defective within.

Mr. LAUDER: The best metal to use in the construction of railway rolling stock is a question of the experience and prejudices of the men engaged. Steel is far superior to iron for boilers of any kind, although within a year some of our Western friends have put in some iron fireboxes. Steel, however, is now abandoned for stay bolts; it would not stand, although so much stronger than iron by scientific test. Where the material is subjected to reciprocating strains, as in piston rods, crank pins, connecting and parallel rods, iron will stand much better than steel. The design is important. A piston rod with a square shoulder is bad design; it should be of equal size the whole length, and then there are no weak parts where the strains will concentrate and produce rupture. A parallel rod to bear the strains put upon it requires a fibrous material like iron, which is far better than steel for that purpose. Our steel rods break every few days, both parallel and piston rods, and we are abandoning them on our road. A good steel crank pin, if large enough so that there is no spring to it, will last forever; but if of small enough design to admit of any spring whatever, it will break in time, while under these conditions an iron pin will last very much longer. So to jump at a conclusion and say that steel is better than iron for all purposes of rolling stock construction is very unsafe.

Iron driving wheel centres break on account of the design of the centres. Some of Mr. Richards' statistics are gathered from European sources, but it is well known that they have not there the strong cast iron we have in this country; they do not use chilled car wheels, because they have not the material to make them of. A cast iron driving wheel centre made of such material as we have in this country, of such iron as we put into cylinders, and properly proportioned, will last almost indefinitely. I remember 40 years ago it was a very rare thing for one of the Hinckley driving wheel centres to break, and they were very light compared with what we use to-day. Later, wheel centres of an entirely different design were made and many have broken. It is not wise to condemn cast iron driving wheel centres because somebody has made a poor design and they have broken. For other parts of the locomotive steel is undoubtedly better than iron. A steel cross-head is preferable to one of iron, for the strains put upon it are so severe that almost any design of cast iron cross-head will sooner or later break. Steel or cast iron cross-heads run between guides will wear rapidly. The best material for this purpose is Eureka steel, made in Chester, Pa. It is a first class quality of cast iron, and the surface is converted into a metal similar to steel and made stronger. Steel for guide bars has been displaced by cast iron. Steel for piston heads has not been much used in this country; cast iron wears much less rapidly.

No quality of steel will make as strong and safe a bolt, where a thread is cut on it, as a good quality of iron, because one of the peculiarities of steel is that if it is nicked even with a file it is liable to break when subjected to shock, and this feature would make it objectionable for many uses in connection with cars. Truss rods and arch bars, I think, would be as safe with a fairly good quality of iron as with steel. Steel rivets for boilers have made no headway; they have been tried repeatedly in locomotive construction; the heads are more apt to fly off than where they are made of a good quality of iron. Though steel has more torsional strength than iron, it has not proved to be a better material for all purposes of locomotive and car construction.

Mr. MARDEN: Steel is destined to enter very largely into car construction. A number of years ago we tried some steel axles without very good success, but steel was then very high in carbon, but there has been very great progress in its manufacture of late years. We want in car construction a metal that will give the greatest strength with the least weight. If bolts or rods can be produced in steel that is equal to the best iron, and can be used much lighter than iron, it seems to me they would be preferable. My experience has been the same as Mr. Lauder's with certain grades of steel, where it has had very high tensile strength it has broken in reciprocating strains. In building some freight cars a number of years ago we found by a series of tests which we had made at the Watertown Arsenal, that we could use a very much thinner steel, and nearly one-half lighter, for certain parts in the truck than we could of iron, and at the same cost. Steel is now produced that is much better in certain parts of car construction than iron, and costs less. This is directly contrary to my experience of ten or twelve years ago in the matter of car axles. I was then decidedly opposed to its use; but the manufacture of steel has been much improved.

Mr. ADAMS: I am in favor of the use of steel in car construction except for axles, as some we used a number of years ago certainly broke more easily under the same strain than iron axles made of good material. Steel axles wear faster than iron. Steel might be used for arch bars, retaining the present size and get the additional strength, because our tonnage is increasing continually, and we cannot make our cars too strong. We have used many steel truss rods during the last two years successfully.

Mr. MARDEN: In 1883 we bought rough turned axles with the journals forged out 1/2 or 3/4 in. larger than the size required. An axle forged 1/8 in. larger than the journal would wear much better and heat less than the others; probably because the journal being forged down close, we did not turn off enough of it to get to the soft part of iron. Steel axles to-day are very low in carbon and are only an improved iron.

Mr. LAUDER—Steel castings will soon supersede expensive and intricate forgings, as the result of trials is very satisfactory. The steel castings are sound and very much smoother and nearer the size and shape required than forgings; consequently the cost of finishing less. Steel castings can now compete with forgings in price, and for many parts can be substituted for iron forgings with advantage, as they are easier to finish, and there is less waste of material in finishing.

A steel journal wears faster than an iron one, because it is softer, though more dense. It is granular, while iron is fibrous. Others reason that there are more hot boxes with it because it is too dense to get good lubrication.

Mr. SINCLAIR: Steel axles do not heat faster than iron. It is very important when a steel axle is specified to see that it is the right kind of a steel axle. Many railroad men, master mechanics and master car-builders have specified steel axles and said nothing more about it, and they got in nearly every instance Bessemer steel, which is unfit for axle purposes, and therefore many failures of steel axles have been attributable to the use of material unfit for the purpose. Mild steel such as you would put into any structure which requires reliability will run as well or better than iron axles. On the New York Elevated weights are reduced to a minimum, and axles as light as possible are used. Iron axles broke, and they have now used steel for 10 years exclusively. The records show that steel will break after a certain mileage. They know within 10,000 miles when a steel axle is liable to break. Iron would sometimes give twice the life of steel, and sometimes only one-tenth. Consequently they consider steel safer than iron. They have no difficulty in lubrication, and the journals run as satisfactorily as iron, and they consider steel preferable, as it is stronger and it has a known life. The tendency is for iron to get poorer and steel to get better. The development of steel castings in the last five years has been enormous. English railways are now using steel castings of their own make. Steel manufacturers here make a satisfactory product. An iron axle will show signs of a coming break before a steel axle will. Steel axles break by minute concentric cracks, not circumferentially around the journal, but eccentric, the centre of the break being an inch or two from the centre of the axle.

Mr. GRAHAM: The West End Railroad have now 1,700 cars equipped with steel axles. They never heat, and give good satisfaction. If electric railroads find steel axles better than iron ones, the cars bounding along as they do, carrying 10 tons, and the motor four tons more, I think the steam railroads would get the same result.

Mr. SINCLAIR: Steel axles are used very largely by the Pennsylvania under passenger equipment, and they run trains about as fast as anybody, and there is scarcely anything else used in Great Britain where the railroads are under close supervision as to the material used; so the use of steel is not confined to slow service.

Mr. LAUDER: I would propose a change in Article 1, Section 1, of the by-laws, so as to have the article read as follows: "The regular meetings of this club shall be held on the second Wednesday of each month, commencing April, 1893," and I offer a resolution to that effect.

The PRESIDENT: Under the by-laws this resolution will be laid over until the next meeting for action.

Adjourned.

Rapid Transit in New York.

After a meeting held last Tuesday the Rapid Transit Commissioners of New York gave out certain resolutions which are printed in a somewhat abridged form below. This is one of the steps toward giving the Manhattan system further privileges, and the resolutions indicate the probable course of events more clearly than is indicated by anything else that the Commission has said since the failure to sell the franchise; therefore they are important.

The Board holds the sale of said franchise in abeyance, and will at any time, upon information that a proposed purchaser is ready to make a deposit with the Controller . . . again offer said franchise at public auction in accordance with the terms of the statute. If such proposed purchaser shall suggest to the Board modifications of the terms of sale, as recently published, which can be made under the provisions of the act, and with due regard to the interests of the city and its people, this Board will duly consider the same with the desire to secure a purchaser for the franchise to construct the railway.

For the purpose of affording relief in the matter of rapid transit, immediately and urgently needed, pending the construction of such railway, it is the duty of this Board to make provision therefor by elevated railways in such manner as to secure the highest efficiency of which they are capable; that being impossible to locate a single line for this purpose in the centre of the city it becomes necessary to provide separate facilities upon the east and also upon the west side. This Board has determined that such separate lines can be located and built independent of any existing lines of transit, but realizes that it may possibly be to the best interests of the city that such temporary system of transit shall be obtained by granting additional facilities to the existing elevated railways for the following reasons:

First—Because there is greater certainty of supplying in such manner and in the shortest time possible the needed relief so imperatively demanded. For, if any additional facilities are granted to the existing system, its owners must at that time accept a contract to construct the same within the period and in accordance with the plans and specifications determined by the Board; while, on the other hand, the franchise for an independent system must be offered for sale at public auction, subject to all the uncertainties incident to such sales.

Second—Because a system of the scope and character needed for immediate requirements can thus, to a great extent, be obtained by the use of streets and avenues already occupied by the elevated railways, while an independent system will require the occupancy of several not now used for such purposes, and which can thus be spared.

Third—Because the Board is advised that at any public sale under the Rapid Transit act of 1891 the franchise must be sold for a gross sum, and not for an annual payment to the city, while if additional facilities are granted to an existing system this Board is by the act expressly vested with power to fix the compensation to be paid therefor either in a gross sum or by annual payments or both, thus enabling the Board to fully protect the financial interests of the city and obtain for it probably larger revenue than would accrue from the sale of an independent franchise.

Fourth—Because under the provisions of the act of 1891 the Board is authorized to impose as a condition for granting additional facilities to the existing elevated railways that travel upon their present lines shall be ameliorated in many needy respects, and that passengers shall be carried to any point within the city limits for a fare of five cents. This secures to the city and to passengers the chief advantages to be derived from competition in operating, though it does not insure rivalry in equipment, speed and general character of accommodation.

Before laying out additional and independent elevated routes, and offering such new franchises for public sale, copies of these resolutions shall be sent to the committee which recently appeared before the board on behalf of the Manhattan Railway Company, with notification that if that company desires to make application to this Board under the terms of the Rapid Transit act of 1891, for additional facilities, or for the construction of additional tracks or connections, or for the acquisition of additional terminal facilities, this Board will take such application under consideration only upon the following conditions:

First—That the elevated railway system shall be so extended within a reasonable time to be prescribed as to transport passengers between the Battery and the northern limits of the city on both the east and the west sides, at a single maximum fare of five cents.

Second—That the company shall make compensation to the city in a gross sum, or by annual payments, or both, as may be determined by this Board.

Third—That, in respect to any application which involves the use of additional avenues and streets in a large degree for the construction of new lines, the Commission reserves the right to offer such franchise at public sale.

The Umbria's Engineer at the Engineers' Club.

At the last fortnightly dinner at the Engineers' Club at its house in New York City, Mr. Lawrence Tomlinson, Engineer-in-Chief of the Umbria, was a guest of the Club. The following extracts from his remarks when answering to the toast drunk to his health we take from the *Iron Trade Review*, of Cleveland, O. In the issue of that journal for Jan. 12 there is a special report of this occasion.

After having been at sea for several days and combatting heavy weather, it was found that the driving or thrust bearing on one of the sections of the main shaft was unduly heating. After doing what all engineers do under such circumstances, it was found impossible to lower the temperature of the shaft and bearing, and the engine was slowed down. This after a few hours was found to improve the condition of affairs somewhat, and the engine was again put up to its normal speed, when the heating of the parts came back again, and at last steam was shut off, and the engine brought to a standstill. I then directed that the cover should be hoisted off the bearing that had given us so much trouble, when I saw a formidable fracture in the shaft, between two of the driving collars or rings. After gathering together my chief assistants I said to them: "You now see what is the matter. I shall now leave you for 10 minutes, in order that you may consult among yourselves in regard to the situation, and when I return if any one has any plans to propose, or suggestions to make, I will be glad to listen to them." At the end of the 10 minutes I came back into the tunnel shaft and asked them if they had thought of any plan by which to get out of the scrape we were in. All shook their heads and said they did not believe that anything could be done by which the ship could make headway while that broken shaft was in her. "Well, lads," I said, "I will tell of a way to do it," and taking a piece of chalk out of my pocket (the chalk age not yet having passed away) I marked on the bulkhead a section of the shaft, and the plan I had for temporarily repairing it: and I am proud to say that, as they looked upon the sketch, and on the shaft, and saw what a lot of hard work there was before them, not one flinched, but all were ready to go at it at once.

And so we gathered up what tools and appliances we had and started in upon what I am sure everyone here knows was a hard and long job, as we were fixed. We had on board some heavy, tough steel bolts 6 in. in diameter, and long enough to take in the rings or collars on each side of the flaw, so I decided to cut out gaps in these rings and drop in these steel bolts and hold the shaft together, and as well transmit the power of the engine through them to the wheel at the other end of the shaft. It was a slow and tedious job to cut these gaps 6 in. deep, through hard steel collars 3 1/2 in. thick. We had plenty of broken drills, and chisels, before we had chopped out these recesses. But at the end of 24 hours we had one bolt in. I had planed to put in five bolts equally spaced around the shaft, but as I found it would add two more days to the delay, I reduced the number to three and concluded to take the chances rather than further delay the ship, drifting as she was out of her course.

In addition to the labor incurred in preparing the shaft, I found that there was a heavy rib in the thrust bearing that would not allow the nuts on the bolts, which were 4 1/2 in. deep, to go around with the shaft, so we had to split or cut the nuts in two pieces, so as to make them only 2 1/2 in. thick, and also cut off the end of the heavy bolts. All this, as you know, was no easy job with the tools we had to work with; but pluck and determination have pulled many an engineer out of difficulties, and so it did us, and at the end of 72 hours of

unremitting labor, by all hands, we were ready to turn on steam and give the shaft a trial. As the crack in the shaft was an oblique one, thus pushing one part ahead of the other, I concluded that I ought to screw up the 6-in. bolts as hard as I could; but there is where I made a mistake, for on starting the engine and gradually increasing its speed to 30 revolutions per minute the head of one of the bolts flew off. I had to shut down again, and we had to prepare another bolt and put it in place of the broken one. But as usual we had learned something, and that was, that when the nuts were hove up hard, there was an additional strain brought on the bolts, by the twisting of the shaft, which they could not stand. So that when the new bolt was put in, it was not screwed up so very hard, and the others were slacked off a bit, and we started again and gradually got the speed up to 10 knots an hour. At last we reached New York; when we all gave a long breath of relief, and took a good long sleep of rest.

If you will permit me to trespass still further on your kindness, I will say a word about the company who own the Umbria. Beginning in their service when I was but a lad, serving as I did my apprenticeship under them, working for them as a journeyman, filling as I have all the various grades as an engineer on their ships, sailing with them in various parts of the world, and in many seas, for 40 years of my life, I want to say that I have always found that if a man in their employ did his duty fairly and honestly, they not only recognized it, but advanced him. I have always found that they have been considerate of all who were in their service, and careful of all who, as passengers, intrusted their lives to their care as they sailed the seas over under their colors.

Train Accidents in the United States in December.

COLLISIONS.

REAR.

1st, on Wabash road, near Warrenton, Mo., a freight train ran into a preceding freight which was taking water, damaging the engine and several loaded cars. The engineer was injured.

1st, on Chicago & Northwestern, at Lake Forest, Ill., a freight train approaching at uncontrollable speed ran into a train of empty passenger cars which had just been made up, ditching the freight engine and 5 freight cars. The fireman was injured.

5th, on Burlington & Missouri River, near Corona, Colo., a freight train broke in two on a descending grade and the rear portion afterward ran into the forward one, making a bad wreck and killing four bridge carpenters.

6th, on Pittsburgh & Western, near Carbon, Pa., a freight train ran into a caboose ahead of it, wrecking the caboose and damaging the engine; engineer and fireman injured.

8th, on Central of New Jersey, at Greenville, N. J., passenger train No. 11, westbound, was unexpectedly stopped at Greenville, the rear car being about 150 ft. beyond the block signal west of the station. Just as the train was ready to start again, train 309, which left Jersey City one minute behind, crashed into the rear car at pretty high speed, wrecking the rear end of that and forcing the car forward into the one next in front of it, wrecking the rear portion of that also. Fifteen passengers were hurt; one of them died the next day and two others were seriously injured. There was a dense fog at the time of the collision. This part of the road has electro pneumatic automatic home and distant block signals. This accident was discussed in the *Railroad Gazette* of Dec. 16.

10th, on New York Central & Hudson River, at La Salle, N. Y., a Michigan Central passenger train, which had been unexpectedly stopped by a delayed freight, was run into at the rear by a New York Central passenger train, wrecking the Michigan Central dining car. Three trainmen were injured.

13th, on International & Great Northern, near Jacksonville, Tex., a freight train broke in two on descending grade and the rear portion ran into the forward one, wrecking 15 cars. Two brakemen were injured.

15th, on Western Maryland, at Midvale, Pa., a passenger train ran into the rear of a preceding freight, badly damaging the engine and caboose. The baggageman was slightly injured.

18th, 1 a. m., on Great Northern, at Nelson, Minn., a wrecking train which had been at work clearing up a wreck which occurred on the 16th, was being made up on the main track preparatory to starting home, when the rear car was struck by a freight train which approached at uncontrollable speed. The wrecking car was thrown upon the car next to it and both caught fire. There were 14 employés in the caboose, of whom 7 were killed and 5 injured. Three of the victims were burned to death.

19th, on Lake Erie & Western, near Lima, O., an eastbound freight train broke apart on a descending grade and the rear portion afterward ran into the forward one, wrecking 15 cars. Two tramps were injured.

19th, on St. Louis Southwestern, near De Soto, Mo., a freight train descending a grade broke apart in two places and the middle portion ran uncontrolled into the forward one, badly wrecking several cars and killing a brakeman.

22d, on Lake Shore & Michigan Southern, at Cleveland, O., a passenger train ran into a switching freight, standing on the main track, wrecking the caboose and damaging the engine and 2 freight cars. The caboose took fire. A brakeman was injured.

23d, on Atchison, Topeka & Santa Fé, near La Junta, Colo., a passenger train ran into the rear of a preceding freight, wrecking the caboose and three cars of sheep. The engine of the passenger train was badly damaged and the passenger cars slightly. The freight conductor, the passenger fireman and one drover were injured.

24th, on New York, Lake Erie & Western, at Hutchins, Pa., a freight train ascending a grade broke in two and the rear portion was stopped; subsequently a part of the front portion broke away and ran back into the the other, which was being pushed forward by a following freight, wrecking three cars and the caboose and killing two brakemen. The caboose and one car were burned up.

And 30 others on 19 roads, involving four passenger and 45 freight and other trains.

BUTTING.

8th, on Houston & Texas Central, near Brenham, Tex., butting collision between a freight and a work train, damaging both engines and injuring one fireman.

10th, on New York & New England, at Pomperaug Valley, Conn., butting collision of freight trains, wrecking both engines and 4 cars. The engineer of the westbound and the fireman of the east-bound train were killed and 2 trainmen injured. It is said that the westbound train was at fault. The conductor had discovered his error and had stopped the train and sent a flag forward, but this action was not taken quite soon enough.

12th, on Central Vermont, near Montpelier Junction, Vt., butting collision of freight trains, wrecking several cars. One engineer was injured. It is said that there was a mistake in giving a telegraphic order.

17th, on Cincinnati, New Orleans & Texas Pacific, near KcKinney, Ky., butting collision between a passenger and a freight train, wrecking the forward portions of both. Engineer and fireman injured. The freight men "forgot" about the passenger, the time of which had been changed a week before.

21st, on Kansas City, Ft. Scott & Memphis, at Lenexa, Kan., butting collision between a passenger and a freight train, making a bad wreck and killing the engineer. Five passengers and 1 trainman were injured, 2 of them probably fatally. It is said that the freight was running five minutes on the time of the passenger train.

22d, on Louisville & Nashville, near Edgefield Junction, Tenn., butting collision of freight trains, wrecking both engines and 10 cars. Five trainmen and 2 tramps were injured.

23d, 1 a. m., on Cincinnati, Hamilton & Dayton, near Deshler, O., butting collision of freight trains, making a bad wreck. One trainman was killed. It is said that an operator failed to deliver an order to one of the trains.

24th, on Pennsylvania, near Pottstown, Pa., butting collision of freight trains, wrecking both engines and several cars. The wreck took fire and part of it was burned up. One brakeman was injured.

25th, on Cleveland, Cincinnati, Chicago & St. Louis, near Hillsboro, Ill., butting collision of freight trains, wrecking both engines and 20 cars; engineer and fireman injured. It is said that the eastbound train was running in disregard of orders.

26th, on Philadelphia & Reading, at Pencoyd, Pa., butting collision between a passenger train and a work train, badly damaging both engines and several freight cars. Two employés and 3 passengers were injured.

28th, on Chicago, Rock Island & Pacific, near Troy, Kan., butting collision between eastbound passenger train and a westbound freight. Four trainmen were killed, and 9 passengers and 1 trainman injured.

28th, on Chicago, Rock Island & Pacific, near Wathena, Kan., butting collision between a passenger train and a freight, making a bad wreck. The baggageman was killed and a fireman badly injured. It is said that the freight had leave to run against the second section of the passenger train, but misread the order, and ran against the first section also.

30th, on Atlantic & Pacific, near Ashfork, Ariz., butting collision of freight trains, making a bad wreck and blocking the road five hours; engineer and fireman of one train killed and those of the other train injured. It is said that an operator failed to deliver a telegraphic order.

And 9 others on 9 roads, involving 4 passenger and 14 freight and other trains.

CROSSING AND MISCELLANEOUS.

1st, on Pittsburgh, Shenango & Lake Erie, at Shenango, Pa., a switching engine standing in the yard was struck by two runaway cars and wrecked, the engineer being killed. The cars had eluded control at a side track two miles away.

2d, on Chesapeake & Ohio, near Ashland, Ky., a westbound passenger train ran into a wrecking train, wrecking 3 cars. There was a dense fog at the time. Three employés were injured.

2d, 3:30 a. m., on Central of Georgia, at Macon, Ga., a freight train ran over a misplaced switch, and the engineman, not discovering his error, proceeded some distance on the wrong track and finally collided with another engine, doing considerable damage. A brakeman was fatally injured.

3d, on Schuylkill & Lehigh Valley, at Slatington, Pa., a freight engine ran into a string of coal cars, making a bad wreck and injuring the engineer and firemen.

5th, on Pennsylvania road, at Pennsville, Pa., a passenger train ran into an engine and two cabooses which were going into a side track but had not quite cleared the main line, badly damaging the caboose and the three engines. Five train men and seven passengers were injured.

6th, on Chicago & Northern Pacific, in Chicago, a passenger train ran into an engine, injuring two passengers. There was a dense fog at the time.

6th, on Lehigh Valley, near Allentown, Pa., collision between a passenger and a freight train, injuring an engineer and a fireman.

6th, on New York, New Haven & Hartford, near Auburn, R. I., an express train ran into the side of a freight which was backing into a side track, doing considerable damage and injuring an engineer and a freight brakeman. The freight men had not properly protected themselves against the passenger train.

8th, on Northern Central, near Marysville, Pa., collision of freight trains, resulting in the death of one brakeman.

8th, on Lehigh Valley, near Flemington, N. J., collision of freight trains, wrecking both engines and several cars and killing 1 engineer. There was a dense fog at the time.

12th, on Pennsylvania road, at Stanwick, N. J., collision of passenger trains, doing slight damage. One passenger was injured. One of the trains had started for Moorestown, but found itself short of time and was backing to Stanwick side track.

14th, on Louisville & Nashville, at Newport, Ky., a freight train with an engine at each end parted while ascending a steep grade. The rear portion ran back, and when it had gone a short distance it was struck by a part of the front portion which had broken away. The rear engine had been deserted and ran out four miles on the main line. The collision wrecked two loaded cars.

14th, on Central of Georgia, near Lavender, Ga., a freight train ran into a work train, badly damaging both engines. One engineer was injured.

15th, on Boston & Albany, at East Albany, N. Y., collision between an empty engine and a freight train, injuring the engineers.

16th, on Perkiomen road, near Perkiomen, Pa., a passenger train ran over a misplaced switch and into the side of a freight train, damaging 10 cars and injuring the mail agent and baggageman.

18th, on Norfolk & Western, at Zuni, Va., some cars on a siding, which had not been securely fastened, ran out on the main track, colliding with engine 237. The engineer was killed and two cars derailed.

20th, on Alabama & Vicksburg, at Jackson, Miss., a freight train backed into a passenger train, doing slight damage. A circus employé riding on the freight was injured.

21st, on Louisville & Nashville, at Birmingham, Ala., there was a slight collision of switching freight trains in the yard. One of the engines, which had been deserted, started back with 4 cars and ran a mile at high speed. Near Tenth street it ran into a train consisting of an engine and 7 cabooses, making a bad wreck. An engineer and fireman were injured.

21st, on Chicago, Burlington & Quincy, at Galesburg, Ill., a stock train ran into some cars standing in the yard, making a considerable wreck. One car, in which were 10 drovers, took fire and 7 of the men were injured.

22d, on Boston & Albany, at East Albany N. Y., slight collision between empty passenger trains, badly damaging 2 cars. One trainman was injured.

24th, on Pennsylvania road, at Burlington, N. J., collision between a passenger and a freight train, wrecking the freight engine and 1 passenger car. Two passengers were injured.

26th, on Atchison, Topeka & Santa Fe, at Emporia, Kan., a passenger train ran into a yard engine, making a bad wreck and injuring the engineer and 2 other trainmen. One passenger was also hurt.

30th, 1 a. m., on Chicago, Milwaukee & St. Paul, near Britt, Ia., a freight train ran over a misplaced switch and into a construction train standing on the side track, wrecking 20 cars. The engineer and fireman jumped into a snow drift and were slightly injured.

30th, on Cleveland, Cincinnati, Chicago & St. Louis, at Springfield, O., a collision of freight trains resulted in the death of a conductor and one brakeman.

And 17 others on 14 roads, involving 4 passenger and 31 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

1st, on Norfolk & Western, at Winston, N. C., a freight train broke through a trestle bridge and six cars fell to the ground below, a distance of 40 ft.; engineer and fireman injured.

7th, on Illinois Central, near Lincoln, Ill., a mixed train was derailed by a broken rail, several cars being ditched. Two passengers were injured.

12th, on Union Pacific, near Hallville, Wyo., a passenger train was derailed by a broken rail and several cars ditched. Three passengers were injured.

12th, on Union Pacific, at Hallville, Wyo., a passenger train was derailed by a broken rail and five cars went into the ditch. Both of them were badly wrecked. Twenty-five passengers were injured, mostly Italian emigrants.

15th, on New York Central & Hudson River, near Herkimer, N. Y., a freight train was derailed by a broken rail, making a bad wreck and piling up about 20 cars, which covered three of the four main tracks. One brakeman was injured.

19th, on Newport News & Mississippi Valley, at Eddyville, Ky., a passenger train was derailed by a broken rail and two cars overturned. The conductor and postal clerk were injured.

21st, on Philadelphia & Reading, at Lofty, Pa., a freight train was derailed by a defective switch, and 20 cars were wrecked. A brakeman was injured.

23rd, on Minneapolis, St. Paul & Sault Ste. Marie, at Deronda, Wis., a passenger train was derailed by a broken rail. One brakeman was injured.

25th, on Denver & Rio Grande, near Marshall Pass, Col., the pay car train was derailed by spreading of rails. The engineer and fireman were badly injured.

27th, on Cleveland, Lorain & Wheeling, at Martin's Ferry, O., a switching freight train was derailed on a high trestle and fell to the ground below. The engineer and fireman were injured. It is said that a defective frog caused the derailment.

31st, on Missouri Pacific, near Eldorado, Kan., a passenger train was derailed by a broken rail and 1 passenger was slightly injured.

And 10 others on 10 roads, involving 3 passenger and 7 freight and other trains.

DEFECTS OF EQUIPMENT.

6th, on Orange Belt, near Oakland, Fla., a passenger train, running at considerable speed, was derailed by a broken truck, 1 car being overturned. Express manager killed.

7th, on Central Vermont, near Ferrisburgh, Vt., a passenger train was derailed by a broken wheel, 7 passengers being injured.

11th, on Missouri Pacific, at Little Blue, Mo., a freight train was derailed by a broken truck and 1 brakeman killed.

22d, on Austin & Northwestern, near Grover, Tex., the passenger car of a mixed train was derailed by the breaking of a wheel and wrecked. The conductor was killed and 4 passengers and a trainman injured.

24th, on Cincinnati, New Orleans & Texas Pacific, near Kincaid, Ky., 6 cars of a freight train were derailed by a Master Car Builders' standard drawbar, which pulled out and fell upon the track.

And 12 others on 11 roads, involving 1 passenger and 11 freight and other trains.

NEGLIGENCE IN OPERATING.

20th, on Southern Pacific, at the crossing of the American River, east of Sacramento, Cal., a freight train, being flagged on the trestle, was stopped very suddenly by the air brakes, and 1 car was derailed.

23d, on Pennsylvania road, at Altoona, Pa., a passenger train was derailed at an unfastened switch and struck a yard engine standing on a side track, doing considerable damage and injuring 3 trainmen.

29th, on St. Louis, Iron Mountain & Southern, at Minturn, Ark., 3 cars of a passenger train were derailed by a misplaced switch; 2 mail clerks, engineer and fireman injured.

30th, on Baltimore & Ohio, at Caldwell, O., the engine and baggage car of a passenger train were derailed by a derailing switch at a point where the engineer failed to obey the signal. The baggageman was injured.

And 6 others on 4 roads, involving 1 passenger and 5 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

5th, on Chicago & Northwestern, near Brookings S. D., a passenger train was derailed by running over an ox and the cars badly damaged. The engineer was injured.

5th, on Union Pacific, near Pocatello, Idaho, a freight train was derailed by running over a cow, and the fireman was killed.

5th, on Union Pacific, near Iron Mountain, Mont., a work train was derailed by running into a landslide and several employés injured.

16th, on Chicago & Eastern Illinois, near Danville, Ill., a passenger train was derailed at an unfastened switch and the 2 foremost cars wrecked. It is said that the switch had been tampered with. The engineer and fireman were slightly injured.

16th, on Philadelphia & Reading, near Mogees, Pa., the engine of a passenger train was derailed by a malicious obstruction, and overturned. The engineer was injured.

23d, on Northern Pacific, near Pee Ell, Wash., a work

train was derailed by running against a tree which had fallen across the track, and 10 cars went down a bank. Engineer, fireman and conductor injured.

26th, on Central of Georgia, near Waynesboro, Ga., the engine of a passenger train was derailed by a malicious obstruction, and overturned. The fireman was injured.

27th, on Burlington & Missouri River, at Perry, Neb., a work train backed into a drove of horses, derailing the train and making a considerable wreck. The engineer and fireman were killed.

And 6 others on 6 roads, involving 2 passenger and 4 freight and other trains.

UNEXPLAINED.

3d, on Louisville & Nashville, at Jenifer, Ala., a freight train was derailed and the engine overturned. A brakeman was injured.

12th, on East Tennessee, Virginia & Georgia, near Whatley, Ala., a passenger train was derailed and the engine overturned. The engineer was injured.

13th, on Pittsburgh, Akron & Western, near Carey, O., a mixed train was derailed and several cars, including the passenger car, were thrown down a bank. One passenger was killed and 2 trainmen injured. The wreck took fire and was burned up, together with about 50 ft. of a trestle.

13th, on Atchison, Topeka & Santa Fé, near Camden, Mo., the baggage car of a passenger train was derailed and the baggagemaster injured.

23d, on Atchison, Topeka & Santa Fé, near Husted, Col., a passenger train was derailed while running at high speed, and most of the train behind the baggage car fell down a bank. The smoking car took fire and, together with one other passenger car, was burned up. Two trainmen and 17 passengers were injured, 2 of the latter fatally.

24th, on Chicago, Milwaukee & St. Paul, at Delmar Junction, Ia., a car of a passenger train was derailed. One passenger was injured by jumping off.

27th, on Atchison, Topeka & Santa Fé, at Emporia, Kan., passenger train No. 1 was derailed and wrecked and 3 trainmen injured.

And 26 others on 25 roads, involving 9 passenger and 17 freight and other trains.

OTHER ACCIDENTS.

28th, on Lake Erie & Western, near Lima, O., a parlor car in a passenger train was badly damaged by the explosion of the heating apparatus. The conductor and 2 passengers were injured.

29th, on Pennsylvania road, near Bristol, Pa., the engine of a passenger train was disabled by the dropping out of the grate.

And 8 others on 8 roads, involving 5 passenger and 3 freight and other trains.

A summary will be found in another column.

Prospects of Railroad Building in 1893.

Since the publication last week of the statement of track laid in 1892 a few additional reports have been received and the mileage reported on the following lines is in addition to that previously published.

Chesapeake & Ohio, from Rush Run, W. Va., 5 miles, and on Kinniconnick branch, to Freestone, Ky., 12 miles.

Milwaukee & Northern, Wausaukee, Wis., to Oconto Lumber Co's camp, 17.5 miles.

Consolidated Terminal at Kansas City, 2 miles.

Burlington & Missouri to Sheridan, Wyo., 105 miles, instead of 101.5 miles, as reported Jan. 13.

Beaver Creek, from Davis, W. Va., 10 miles.

Lehigh Valley on Loyal Sock Branch, between Bernice, Pa., and Harvey's Lake, 14.3 miles; from Coxton to Austin, Pa., 2.9 miles; on Lehigh Valley Terminal, between Newark and Jersey City, N. J., 3.3 miles, and near Perth Amboy, 4.5 miles.

Louisiana Central, 4 miles, instead of 3 to Hainesville, La.

Pennsylvania Lines, 1.2 miles to Bishop, Pa.

North Galveston, Houston & Kansas City, between Virginia Point and North Galveston, Tex., 16.7 miles, instead of 9 miles as reported Jan. 13.

Massillon branch of Cleveland, Canton & Southern, near Navarro, O., 8 miles.

Wilmington, Onslow & North Carolina, 6 miles instead of 1 mile reported Jan. 13.

The additional mileage is 97.7 miles. The amount to be deducted is six miles in Arkansas, on the Texarkana & Fort Smith, and six on the Baltimore & Ohio in West Virginia.

The net increase is 85.7 miles and the corrected total for the United States is 4,150 miles.

We republish the table showing the new track by states:

Alabama	24.	New York	264.8
Arizona	19.	North Carolina	49 3
Arkansas	33.5	North Dakota	92.
California	89.8	Ohio	212.
Colorado	20.4	Oklahoma	11.
Florida	134.1	Oregon	13.5
Georgia	61.8	Pennsylvania	325.4
Idaho	82.7	South Carolina	36.2
Illinois	81.	South Dakota	5.5
Indiana	155.9	Tennessee	74.8
Indian Territory	102.2	Texas	227.7
Iowa	54.5	Utah	28.7
Kansas	1.	Virginia	27.
Kentucky	52.5	Washington	432.4
Louisiana	78.8	West Virginia	200.3
Maine	15.	Wisconsin	122.8
Maryland	20.5	Wyoming	105.
Massachusetts	23.		
Michigan	201.	Total, United States	4,150.
Minnesota	189.7	Canada	273.
Missouri	201.	Mexico	301.
Montana	127.3		
Nebraska	76.5	Total, Foreign	574.
New Hampshire	28.7		
New Jersey	41.3	Grand total	4.724.
New Mexico	5.8		

Supplementing the record of track laid, we give in this issue a compilation in which an attempt has been made to show where more or less new railroad building is likely to be done in the year 1893. The lines included in the statement are those upon which work has been begun or is under contract, lines located, and, in a few cases, lines not located, where the iuformatioh now at hand seems to indicate that considerable work will be done in the next few months.

NORTHERN STATES EAST OF THE MISSISSIPPI.

Maine.

Bangor & Aroostook.—Main line, Brownville northeast to Caribou, 154 miles under construction. Considerable grading done in 1892. C. P. Treat, Chicago, contractor. Branches surveyed from Oakfield, near Patten, north to Ashland, 42 miles; branch from Sprague's Mills to Ft. Fairfield, 13 miles. Projected, Caribou to Van Buren, 20 miles. F. W. Cram, General Manager, Bangor; Moses Burpee, Chief Engineer, Houlton, Me.

George's Valley.—Warren Station to Union, 8 miles; part of line graded, will probably be completed in the spring. I. C. Thurston, South Union, Me., President.

Maine Shore Line.—Stillman east through Shore Line counties to Calais and Eastman, 110 miles; surveyed several years ago. No active work now being done. S. D. Leavitt, Eastport, Me., President.

New Hampshire.

Exeter.—Exeter south to East Epping, 5 miles; contract will probably be let in early part of this year. John J. Bell, Exeter, N. H., President.

Vermont.

Black River.—Contracts recently let from Proctorsville east to Claremont Junction, 12 miles, all surveyed.

Massachusetts.

Plymouth County.—East Weymouth to Brant Rock, about 25 miles; surveyed over a year ago. No other work done. John T. Simmons, Boston, President.

Southbridge, Sturbridge & Brookfield.—Brookfield to Southbridge, located in 1892, 13 miles; contract now under consideration. C. Moore, Sturbridge, Mass., Chief Engineer.

Rhode Island.

New York & New England, on Providence & Springfield.—Pascoag northeast to connect with the N. Y. & N. E. R. R., 6 miles; under construction. Ward Bros., contractors. Wm. Tinkham, Providence, R. I., President.

New York.

Binghamton & State Line.—Three routes surveyed from Binghamton south to Pennsylvania state line, 15 miles, Joseph K. Noyes, Binghamton, N. Y. Chief Engineer.

Brooklyn Elevated.—Fifth avenue and Thirty-eighth street to Third avenue and Sixty-seventh street, Brooklyn; Fulton street and Schenck avenue to Crescent street and Jamaica avenue. Cofrode & Saylor and Edge Moor Bridge Works have contract for elevated structure. O. F. Nichols, Brooklyn, N. Y., Chief Engineer and General Manager.

Buffalo & Geneva, on Rochester & Honeoye Valley.—To complete the road between Rochester Junction and Honeoye Falls, 2.5 miles, under construction. Paul S. King, Buffalo, N. Y., Chief Engineer.

Catskill & Tannersville.—Catskill Mountain Station to Tannersville, 1 mile, under contract and construction. James Stead, Catskill, N. Y.; C. L. Rickerson, New York City, President.

Croton Valley.—Croton Point to near Ridgefield, Conn., on the state line; surveyed in 1892. I. Aaron, 48 Wall street, New York City, Secretary.

Lake Hopatcong, Boontown, Morristown, Caldwell & New York.—Caldwell, westerly to Rockaway, 18 miles; branch to Morristown, 7 miles; all surveyed, right of way about secured. C. C. Vermeule, New York City, Chief Engineer.

Long Island, on New York Bay Extension.—Hemstead Crossing, south to Valley Stream, 6 miles; partly graded last summer; work now suspended; right of way not all secured. P. D. Ford, Long Island City, Chief Engineer.

Niagara Junction.—End of track at Niagara Falls to Lockport Branch of N. Y., C. & H. R. R. R., 4 miles, under construction, being built by Cataract Construction Co. Mairs & Lewis, New York City, and B. P. Smith, Rochester, N. Y., contractors. George B. Burbank, Niagara Falls, Chief Engineer.

Oscawana & Cornell.—Five miles, Oscawana to new Croton aqueduct dam at Cornell, located and ready for construction; 21 miles to be located. W. H. Gale, 44 Pine street, New York City, President.

Rome, Watertown & Ogdensburg, on Gouverneur & Oswegatchie.—End of track laid in 1892 at Gouverneur east, toward Edwards, 13 miles, track being laid. E. Van Etten, Watertown, N. Y., Superintendent.

Unadilla Valley.—End of track at Leonardsville, south to New Berlin, 15 miles. G. L. Rusling, 137 Broadway, New York, is contractor; F. A. Culver, 80 Broadway, New York, Secretary.

New Jersey.

Rockaway Valley.—Into town of Morristown, 1 mile; and to State Asylum, 2 miles, surveyed. J. E. Melich, Morristown, N. J., Engineer.

Pennsylvania.

Altoona, Clearfield & Northern.—Doughertys to Coalport, 8 miles; located. F. G. Patterson, Altoona, President.

Bloomsburg & Sullivan.—Jamison to Gonaga Lake, 13 miles, surveyed. F. M. Leader, Bloomsburg, Pa., General Manager.

Buffalo, Rochester & Pittsburgh.—On Clearfield & Mahoning, Jefferson Line west to Clearfield, 26 miles; under contract and construction, tracklaying just begun. J. M. Floesch, Clearfield, Pa., Chief Engineer.

Buffalo & Susquehanna.—End of track, 3 miles, from Hull's east to Galeton, 17 miles, all graded. D. A. Crage, Buffalo, N. Y., and Broadhead & Bryon, Galeton, Pa., contractors. C. E. Rottsford, Austin, Pa., Chief Engineer.

Delaware River & Lancaster.—Springfield to Lancaster, 30 miles; projected. Isaac W. Guldin, Reading, Pa, Chief Engineer.

Fall Brook.—Mills to Ulysses, 7 miles, will be built early in the spring. Robert H. Canfield, Corning, N. Y., Assistant Superintendent.

Keystone.—Projected near Gardeau, 7 miles. L. G. Willson, Gardeau, Pa., Secretary.

Kislacoquillas Valley.—Track will be laid in a few weeks between Reedsville and Bellville, 9 miles; some track built in 1892. F. F. Whittekin, Belleville, Pa., Chief Engineer.

Lancaster, Oxford & Southern.—End of track to Providence Mills, 1 mile, under contract; Providence Mills to Oxford, 9 miles, located. A. M. Nevin, Oxford, Pa.

Newport & Sherman's Valley.—Valley Road Station to New Bloomfield, 3 miles, under construction; New Germantown to South Broad Top coal regions, 30 miles, preliminary survey made in 1892. D. Gring, Newport, Pa., President.

Oregon & Texas.—Cammel to English Centre, 8 miles, under construction.

Pennsylvania.—Roxborough branch, Chester Avenue Station, Philadelphia, to White Marsh; Fort Washington branch to Fort Washington, 5 miles; Philadelphia & Bustleton, to Bustleton.

Perry County.—From end of track, about 8 miles from New Bloomfield to Landisburg, 4 miles, graded and ready for the rails. F. K. Holtzinger, New Bloomfield, Pa., Superintendent.

Philadelphia Belt.—Bridge street, Philadelphia, along Delaware River to Princeton street, 2 miles, under contract. C. S. Campbell, 227 South Fourth street, Philadelphia, contractor; J. A. Wilson, C. E. and D. Jones Lucas, Drexel Building, Philadelphia, P. A., Engineer.

Philadelphia & Reading, on Philadelphia & Northern.—Wister Station to Glenside, 7 miles, under construction.

Tionesta Valley.—Hilltop to Sandy Creek, 2.5 miles, and Parish to Hunter's Run, 5 miles; company doing grading. F. F. Whittekin, Tionesta, Chief Engineer.

Tionesta Valley & Hickory.—Grading completed last month, Tionesta to Ross Valley, 5 miles; tracklaying to be begun in the spring. T. D. Collins, Nebraska, Pa., President.

Western Maryland.—End of track at Menges Mills, near Porters, northeast to York, 11 miles, under construction, contract work about completed.

Wilkesbarre & Eastern.—Stroudsburg west to Wilkesbarre, Pa., about 65 miles, under construction and track-laying begun at Pocono Summit. Wilkesbarre & Hudson River Construction Co. is building the line, of which R. H. Talcott, 59 Wall street, New York City, is the Manager. I. E. Hartwell, of Wilkesbarre, is Chief Engineer of the road.

Williamsport & North Branch.—Nordmont northeast to Dohm Summit, E. T. Gaynor & Co., La Porte, Penn., contractors; B. S. Welch, Hugesville, Pa., General Manager.

Ohio.

Columbus, Lima & Milwaukee.—Defiance to Lima, 42 miles; roadbed constructed in 1891; 375 miles projected; officers state that construction will be resumed in the spring; H. Sabin, Marysville, O., President.

Dayton, Lebanon & Cincinnati.—Centreville, north to Dayton, 13 miles, located.

Eastern Central.—Preliminary surveys made between Galion and Millersburg, 60 miles. R. H. Lee, Loudonville, O., Chief Engineer.

Findlay, Fort Wayne & Western.—End of track at junction, with Cin., Jack. & Mack. Railroad west to Ohio and Indiana state line, 11.5 miles; track now being laid. B. W. Fenton, Findlay, O., Chief Engineer.

Ohio Southern.—Wellston, southeast, 10 miles, under construction; from Springfield northwest to Lima, 60 miles, contract let to McArthur Bros., of Chicago. H. T. Douglas, Springfield, O., Chief Engineer.

Pittsburgh, Akron & Eastern, on Akron & Eastern.—Akron, O., east to Newcastle, Pa., 70 miles; located in 1892. J. H. Sample, Akron, O., Chief Engineer.

Snow Fork & Hocking.—Coal branch of Baltimore & Ohio, Rock Run, south about 20 miles to coal fields; terminals not fixed; right of way only partly secured. David Lee, Zanesville, O., President.

Toledo, Walhonding Valley & Ohio.—End of track at Loudonville, southeast across Ohio to the Ohio River, near Bellaire, 84 miles, projected. The line is operated by the Pennsylvania. J. A. Hanlon, Coshocton, O., Chief Engineer.

Indiana.

Brookville, Richmond & Union City.—Harrison, near Cincinnati, north to Union City, 68 miles; surveyed in 1891, and right of way partly secured. Joseph Ramsey, Jr., Cincinnati, President.

Chicago, Indianapolis & Chattanooga Southern.—Indianapolis, southwest to Mitchell, 75 miles, and Mitchell southwest to Rockport, 65 miles; surveyed in 1892; right of way partly secured. J. H. McCormick Columbus, O., Chief Engineer.

Cincinnati, Union City & Chicago.—Union City to Huntington, 65 miles, located, and it is thought will be built during 1893. Frank White, Union City, Ind., Chief Engineer.

Elgin, Joliet & Eastern.—McCool to Porter, 5 miles; grading begun recently. E. H. Lee, Joliet, Ill., Chief Engineer.

Findlay, Ft. Wayne & Western.—Nearly all graded in 1891 from Ohio state line west to Ft. Wayne, about 20 miles. Track now being laid to Ohio state line, will probably reach Fort Wayne in a few months.

Fort Wayne, Terre Haute & Southwestern.—Partly graded from Mansfield to Bainbridge, 18 miles; work delayed by litigation; contract let to E. P. Reynolds & Co., of Cincinnati. F. P. Welch, Rialto Building, Chicago, General Manager.

Indiana, Illinois & Iowa.—Knox north to South Bend, 33 miles, located in 1892; will probably begin work in the spring. W. K. Woodruff, Kankakee, Ill., Chief Engineer.

Indianapolis, Logansport & Chicago.—Logansport, south to Indianapolis, 70 miles; right of way secured, except at Indianapolis; contract to be let soon, and line completed perhaps this year. Walter A. Osmer, Logansport, Ind., Chief Engineer.

Lafayette & Monon.—Survey made for about two miles from Lafayette. George W. Warwick, Lafayette.

Illinois.

Calumet & Blue Island.—A branch of about four miles, surveyed near South Chicago. F. C. Bates, South Chicago.

Chicago & New Orleans.—Surveyed from Altamont south and southeast to Carbondale, 106 miles; some grading done in 1891; stated that work will be resumed this year. Branch projected from Jefferson County to Paducah, 80 miles. Oliver Ferguson & Sons, Evansville, Ind., contractors. A. G. Murray, Springfield, Ill., President.

Clayton & Pea Ridge.—Clayton, northeast, 12 miles, under contract; work will be commenced in the spring. D. M. Halsted, Const. Co., Clayton, contractors; C. M. Wever, Clayton, Ill., secretary.

Jacksonville Southeastern.—Havana to Canton, 20 miles, under construction; Canton, north to Rock Island, 100 miles, surveyed in 1892. W. S. Hook, Jacksonville, Ill., President.

Peoria Terminal.—In Peoria two miles double track under contract. C. C. Gilman, Marshalltown, Ia., contractor; C. E. Wickham, Peoria, Ill., Chief Engineer.

St. Louis & Eastern Illinois.—End of track near Glen Carbon to Marine, 10 miles. N. W. Irish, contractor; William E. Guy, St. Louis, President, and Robert Moore, St. Louis, Chief Engineer.

Michigan.

Lowell & Hastings.—Freeport to Hastings, 8 miles, surveyed. W. H. Clarke, Lowell, Mich., Traffic Manager.

Mancelona & Northwestern.—Mancelona to Cedar River Valley, six miles surveyed, which will be built soon to complete line. W. H. Thompson, Mancelona, Mich., President.

Manistee & Grand Rapids.—Manistee to Manistee River, 3 miles, under construction; junction with Chic. & W. Mich. R. R. to timber lands, 11 miles surveyed; Luther to Grand Rapids, 75 miles, projected. E. W. Muenscher, Chief Engineer, Grand Rapids.

Manistique & Northwestern.—Manistique to Negaunee and iron mines, in upper Peninsula, 91 miles; surveyed and located, no contracts yet awarded. S. H. Beardslee, Manistique, Mich., Chief Engineer.

Wisconsin.

Ahnapee & Western.—Ahnapee northeast to Sturgeon Bay, 20 miles; grading being done by the company. E. Decker, Ahnapee, President.

Bayfield & Great Western.—Bayfield to Iron Range Station, 18 miles; located in 1892. F. W. Dalyrmple, Bayfield, President.

Chicago, Lake Geneva & Northwestern.—Lake Geneva to Madison, 70 miles. Negotiations under way for construction; D. C. Dunlap, President, 526 Rialto Bldg., Chicago, Ill.

Chippewa River & Menomonee.—End of track northward, three miles, under construction; projected about 25 miles toward Hayward. W. Irvine, Chippewa Falls, Secretary.

Milwaukee & Superior.—Sussex to North Lake, 8 miles, surveyed; projected to Superior. W. Powrie, Templeton, Wis., Chief Engineer.

SOUTHERN STATES EAST OF THE MISSISSIPPI RIVER.

Maryland.

Baltimore Belt.—Hamburg street, Baltimore, to Bay View Junction, 7 miles; tunnel work nearly completed. Controlled by Baltimore & Ohio. Ryan & McDonald and L. B. McCabe & Bro., of Baltimore, contractors. W. T. Manning, Chief Engineer, Baltimore.

Washington & Chesapeake Beach.—Construction will begin this month from a point near Washington southeast to Chesapeake Bay, 27 miles; contract let in December to Godeffroy & How, 45 Broadway, New York City. L. H. Hyer, Washington, D. C., Chief Engineer.

Virginia.

Abingdon Coal & Iron.—Abingdon to Damascus, 15 miles, grading to be finished in January; Damascus to Mountain City, 16 miles; surveyed. J. C. Watson, Jr., Abingdon, Va., Chief Engineer.

Chesapeake & Ohio.—On Buckingham Branch, end of track at Mitchells', near Arvor, south to Rosney, 8 miles; grading about completed. H. Frazier, Richmond, Chief Engineer.

Gladesville.—Wise C. H. north to Gladesville, 15 miles. The contract for the road will probably be let in the spring and work completed next summer. E. M. Fulton, Wise C. H., Va., President.

Glasgow Belt.—About 1.5 miles at Glasgow; no work being done. T. Williams, Glasgow, Va., Secretary.

Glendon & Gulf Mining & Manufacturing Co.—Gulf to Fair Haven, 10 miles; under construction; 9 miles has been graded, the company doing its own work. Frank D. Jones, Gulf, N. C., Chief Engineer.

Marion & Rye Valley.—Marion to Currin Valley, 6 miles; surveyed and partly graded in 1892. Work now suspended. George W. Richardson, Marion, Va., Vice-President; W. C. Foster, New York City, Chief Engineer.

Norfolk, Wilmington & Charleston.—Norfolk, Va., south to Charleston, S. C., 352 miles surveyed. C. W. McKibben, General Manager, Philadelphia, Pa.

Richmond & Chesapeake.—Richmond northeast to Potomac River, 67 miles, including a tunnel under one of the streets at Richmond, Va. The contract for latter work is let to Mason, Hoge & Co., of Frankfort, Ky. No work has been done for several years. N. E. Reed, of New York City, is President.

Roanoke, Fincastle & Clifton Forge.—Fincastle south to Cloverdale, 11 miles, nearly all graded in 1891; survey to be made for extension to Roanoke. James K. Brown, Roanoke, Va., Chief Engineer.

(*Continued on page 54.*)

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

WE publish on another page a description of a system of keeping accounts of material used in railroad shops which is of more than usual interest to railroad officers who are looking for opportunities to economize. It is shown that in this case by simply insisting on the adoption of a system which, as was found, did not require the employment of additional clerical force, the value of material kept on hand was reduced about $350,000, on one line of railroad. This would seem to be a promising field for the introduction of improved methods on many roads, and is a further illustration of the point emphasized by Mr. Barr in his recent paper before the Western Railway Club entitled "Lubrication." Comparing the possible saving in this direction with that by watching the expenditure of lubricants, we find that the total cost of one large system of road for lubricating freight and passenger cars for a year is approximately $37,000 with a monthly passenger car service of over 2,000,000, and a freight car mileage, loaded and empty, of about 17,000.000 miles. It will be seen that the possible saving which could be effected in the cost of lubrication would not be anywhere near as much as the interest on the amount of the reduction which has been made in the case of the road using the system described, in the value of the repair material kept on hand, by means of this system of accounts.

The resolutions of the Rapid Transit Commissioners of New York, printed elsewhere, are the first definite and public statement of what the Board has decided to do at once. It appears that, for the very good reasons that are given, the Board will receive propositions from the Manhattan for extensions of lines and for improvements of existing lines. This is very sensible, and is in fact, the only sensible thing to do. Certain conditions are laid down, among them that the city shall be paid something for the rights given. This, too, is sensible and just, but it must be remembered that there are two classes of improvements that the Manhattan company ought to make, and probably wishes to make. By one class it can increase the passenger movement considerably with little first outlay or additional operating expenses. This can be done by better terminals, more tracks on existing structures, and larger station platforms to admit of longer trains. The other class will increase the passenger movement also, but at large first cost and greatly increased cost of operating; this is by new lines. Both classes of improvements are for the public good and should be hurried forward; but the net result for the Manhattan company will be very different from the two classes. It must not be forgotten that the business done by the new lines will be partly, and in some places largely, drawn from the old lines. So the obvious thing for the Commissioners to do is to tie the two classes of improvements together if they can, so that both shall be pushed. Probably the Commissioners will not make the mistake of making the conditions too burdensome for the Manhattan company to accept; but a very little reflection will show any one that this could easily be done. It is not that company that is in a position to ask favors: it is the city. This fact has been forgotten all along by most persons who have talked on the subject.

An editorial note in the *Railroad Gazette*, Dec. 30, criticising the *Electrical World* for advocating an automatic stopping device which should absolutely deprive the locomotive of power to move itself after passing a distant signal, has been misread by at least one person, and assumed to be a criticism of the Kinsman block system, which shuts off the steam and applies the brakes at the distant signal, but nevertheless leaves it at the discretion of the engineman to release the brakes and steam ahead. No such criticism was made or intended to be made. In order to make this clear we reprint the misunderstood words, with amplifications in brackets. "The fact is that there are fundamental weaknesses in this proposition [The proposition of the *Electrical World* to use a system which deprives the engineman of all control of his engine], weaknesses that exist whether the locomotive be steam or electric. One of these is, that [there are] a great many heavy and slow trains [which] cannot be run, under the usual conditions now existing, if the power is [absolutely] withdrawn from them at the distant signal. [They would be intolerably delayed.] The engineman, although he knows on passing that signal that he must stop at a certain point further on, is often obliged to use steam up to within a very short distance of the home signal. Another case where the theory would fail in practice is on a long descending grade. Withdrawing the power would not stop the train at such a place. It will be answered that the signal apparatus could automatically apply the brakes; but, as was recently pointed out in these columns [in a description of the Kinsman block system, Sept. 23], it is necessary when using a brake-applying apparatus to place it under control of the engineman; that is, give him the power to [instantly] make it inoperative when necessary. [The Kinsman system does this. It is necessary, for the prompt movement of trains on ordinary railroads, where slow freight and fast passenger trains are guided by the same signals, to give to the engineman the greatest possible power over his engine unintermittently. The *Electrical World's* scheme would be the same as setting the brakes and fastening them in that position; for after the train was automatically stopped on a descending grade, the runner could not be trusted to let the brakes off and permit the train to run on, because there would not be any second automatic apparatus to apply them when he finally came close to the home signal.]"

Railroad Presidents on Pooling.

The Cullom (Senate) Committee has sent out the full report of the hearing on Dec. 14 when Presidents Roberts, Depew and Ingalls gave their views on the subject of pools and their five-years' experience in doing business under the law which forbids pooling. These gentlemen brought out no new facts, but restated many that are now well known—or ought to be. Mr. Depew's semi-humorous illustrations were apparently a feature of the meeting. Mr. Ingalls, who had had the most intimate personal experience with pools, and Mr. Walker, who was the most successful in clearing up the Senators' minds, stated the case most clearly. The substance of the testimony may be very fairly summarized by what the *Railroad Gazette* said when the pending bill was introduced, viz.:

> The main reason why pooling should not be prohibited is that it is the essential feature of the most successful plan ever tried for preventing discriminations, rate wars and instability of rates; all of which are as harmful to the public at large as to the railroads themselves. This is all that the advocates of pooling claim for it. The basis of its success lies in the fact that it removes the motive for secret reductions of rates. . . . The detection of illegal practices among railroad officers many times hinges on evidence which can only be got from other railroad officers. These men would often be quick to expose the acts of a competitor if they knew that the worst penalty would be a fine, to be paid by the company, when they would wholly refuse to divulge a word if they thought a personal acquaintance, or even a fellow-sinner, might come within the shadow of the jail.

The significance of the hearing hinged, therefore, on the eminence of the witnesses. Mr. Roberts was very decided about the imprisonment penalty. He said that he would not hesitate to accuse his competitors if the punishment were sure to fall upon the company, not the individual, even if the penalty were $100,000, but that the brotherhood of humanity would always keep railroad agents from bringing one another to the door of the jail. When Mr. Roberts said that the pools which existed previous to 1887 were unenforceable, the Committee wanted to know the reason; and the most that Mr. Roberts could say was that the courts would have declared them contrary to public policy. But they never were taken to the courts, and the real explanation is that public sentiment was then so unenlightened that no railroad men dared to even attempt to prove the justice of pools and their fairness to the public; this point Mr. Roberts did not bring out. To show that a pool would prevent unhealthy competition while leaving healthy competition unfettered was then an impossible task; after six years' additional experience it may be easier.

Mr. Ingalls was decidedly in favor of retaining the present fifth section rather than permit pooling without government supervision. He thinks that the blackmailing practices of weak lines, which would carry freight at less than cost so as to have a large tonnage record when the percentages were revised, would be intolerable. There was some difference of opinion in regard to the probable practical results of placing the supervision of pools in the hands of the Interstate Commerce Commission. Mr. Walker thinks a half-dozen pools would cover the business east of the Mississippi and north of the Ohio, but Mr. Ingalls says that in the old days 30 or 40 were required. As a government tribunal would naturally be a strict constructionist, Mr. Ingalls very likely is right. To put a pool in sufficiently definite form to satisfy the Commission it would probably be necessary to take up each important shipping point by itself.

Mr. Depew made some general statements about the decadence of small manufacturing towns under the present law, but the only definite testimony on the point was the following statement by Mr. Ingalls:

> Take the Cleveland, Cincinnati, Chicago & St. Louis. We have 2,500 miles of grain road. You do not see any small dealers doing any business any more. They are agents for some Chicago or Toledo house. They have had to go out of business. You are accomplishing in this country what is the worst thing that could happen to any country—you are driving the small dealers out of business.

But how much of this change is due to the competition of markets, stronger than the competition of railroads, which was spoken of later, no one attempted to say. In speaking of injustice to small traders, Mr. Depew mentioned one private car line which made 83 per cent. on the value of its cars in one year. This puts our former record, 56 per cent., badly in the shade.

Probably the weakest feature in the presidents' argument was their failure to show how the competition of markets and the force of public opinion would overrule any attempt at extortion on the part of the railroads. The argument was stated, but not with sufficent fullness. The railroads promise, in substance, that if permitted to keep freight rates up, they would refrain from exercising the power whenever rates ought, in justice to the public, to go down. To convince Congressmen of the validity of this promise, the public spirited railroad officers who make it should clearly describe the economic forces which will prevent it being broken by railroad officers who are not public spirited, and not even disposed to be just. To merely say that rates constantly tended downward in this country from 1877 to 1887, in spite of pools, is not a sufficiently convincing argument. Some Congressmen think that rates did not fall fast enough. What were the forces which reduced rates in spite of pools? It will be claimed that some of them, the cheapening of steel rails and the increase in the size of locomotives, for instance, are no longer active. The fact that grain rates to Europe via Newport News and even via Savannah will keep down the rates via New York should be set forth with particularity; also that New York rates, by the influence of the long-and-short-haul principle and the public support of it, by the influence of competition at a hundred interior junctions and by the more enlightened policies now prevalent in railroad offices, will keep interior rates reasonable. The fact that railroad officers understand public opinion much better than formerly and are more prompt to carry out its wishes needs to be stated specifically, with illustrations. The need of expensive safety appliances—which both the public and the railroads recognize much more fully than they did six years ago—is a powerful argument for *not* reducing rates, and one which Congressmen will perhaps admit, if it is set before them with definiteness. All these and many other facts need to be carefully built up into a cogent and complete argument, if Congress is expected to act intelligently on a bill to permit pooling. The members of this Committee do not seem to place much reliance upon the supervisory function of the Interstate Commerce Commission as a safeguard

against extortion; they seem to have demanded the same assurances from the railroads that they would if secret pooling were going to be allowed.

The most impressive exhibit of facts at Washington was that about secret rate cutting. Nothing specific was stated, but yet the way in which the speakers, especially Mr. Roberts, repeated over and over the assertion that such devices were everywhere common, if not universal, had the effect of a sworn statement. After reading this testimony one must conclude that the press reporters, in telling now and then about the complaints of freight agents that competitors are secretly underbidding them, are understating the case rather than overstating it. The complaining roads, instead of making too much outcry, are not making enough. Here again the roads ought to present their argument in detail so as to give it force. The abolition of the imprisonment penalty will do good if it leads to the exposure of secret illegalities and shows up their prevalence, even if they are not prevented; for exposing their details and the ways of perpetrating them will tend to prove the impossibility of stopping them by penal statutes, and thus enforce the need of pools.

Steel in Locomotive and Car Construction.

The discussion on steel *vs.* iron at the New England Railroad Club, reported elsewhere in this issue, rather emphasized what is well known than brought any new facts to light. Possibly, however, it cannot be too often repeated that steel can only successfully stand repeated strains in opposite directions when it is suitable for its purpose both in quality and form.

While it is possible to make steel for certain purposes from poor material and ores containing a large percentage of phosphorus, it is certain that the steel itself should be almost absolutely free from noxious ingredients if it is to give satisfaction in hard service, while the best steel will fail if it be "nicked" or shaped so as to concentrate the strain at one point. While steel is a complex body influenced by the slightest percentage of many ingredients from which it cannot be wholly dissociated, it is perhaps not too much to say that the great majority of cases of failure of steel axles, crank pins, piston rods, etc., can be traced directly either to inferior ore, faulty manipulation, or bad design.

While many new processes enable good steel to be made from cheap materials which could not be formerly utilized, all processes, both old and new, do undoubtedly occasionally turn out inferior material. A variation in the heat will affect steel made by some methods, and in others the injurious amount of phosphorus eliminated in ninety-nine samples is found in the hundredth. This inequality of product can only be guarded against by constant and systematic tests, and where thoroughly carried out a remarkably uniform quality of steel is regularly obtained. Any abnormal result of a test leads at once to an inquiry into the whole history of the faulty sample; and experience will show the origin of the weak point and how it can best be eliminated in the future. Unless, however, the tests are constant and systematic, every failure comes as a surprise and a mystery. Tests made after the damage has been done show generally that the material is something totally different from that on which the last tests were made, and in the mean time many causes have arisen to finally produce a disastrous result. It does not follow that steel must necessarily be condemned as an unreliable material. It is, when properly treated, undoubtedly the most valuable material known to engineers to-day.

One of the most specious arguments used against steel is deduced from the mileage of broken axles, which often show that the average mileage of the broken steel axles is less than that of the iron. This is by no means a conclusive argument; for if the statistics of the axles still running be examined, it will almost invariably be found that steel has proved more durable than iron. The explanation of this seeming anomaly is simple. A new steel axle which has a flaw or is "nicked" in any way is doomed from the start. The crack will gradually but surely spread in the homogeneous material, and the axle will fail or be condemned for a growing flaw after a comparatively short life. The remaining axles being sound will continue to run and give a long mileage, and when finally removed will still be sound, though worn below the minimum size. The iron axles, on the other hand, begin the progress of disintegration at once. The more or less imperfectly welded fibers begin to separate, and after a certain time the great majority have been condemned, while the greater number of the steel axles are still running, though possibly none of the iron axles failed as soon as the faulty steel ones.

Steel, however good and suitable in quality, cannot stand unless it is also of suitable form. Some have very incorrectly stated that the section of steel exposed to heavy service should be alike throughout. A car axle, according to this dictum, should be of the same diameter throughout its length. This form, however, was abandoned in the very early days of railroads, owing to the persistency with which fractures occurred just inside the wheel hubs. The true law is manifestly that the section should vary according to the strain, and that the strains should be as nearly uniform as possible throughout the axle, subject to the proviso that there should be no sudden change of form. It will be found that steel fails where this rule is disregarded, and stands where it is observed.

One instructive instance is found in the well-known case of the bolts by which armor plates are attached to a ship's side. The hard wood backing used between the armor plate and the skin of the hull compresses when the armor is struck by a shot, and its rebound fractured all the bolts tried until Palliser brought out a bolt in which the shank was reduced until its cross section was somewhat smaller than that at the bottom of the threads. When the rebound took place, this bolt stretched a percentage of the whole length of the shank, while with an ordinary bolt the stretch could only take place at the bottom of the threads, and this distance was too short in which to cushion the blow. A large number of failures of steel would never occur if attention was paid to the principle here involved and concentration of the maximum strain carefully avoided.

Steel is acknowledged to be the only material for tires, and a great majority are strongly in its favor as the best material for car axles. But in both forms the steel is not nicked, there are no square shoulders or sharp re-entering angles, and the whole piece is proportioned to give an approximately equal strain throughout. Complaints as to the behavior of steel commence when it is used in such forms as piston rods, with square shoulders and the section reduced to half the normal area by the square-ended keyways, which by some freak of fate still manage to exist half a century out of date. Steel, too, has of course been found a doubtful material for crank pins or driving axles which are shouldered down on entering the wheel fit, the idea being apparently that the section should be suddenly diminished just where the axle or crank pin encounters the additional work of sustaining the compression put on it by being forced into the hub of the wheel.

Crank pins are now very generally enlarged on entering the wheel, and the result is usually that breakages cease entirely. At some future period the same cure will be tried on driving axles, and many persons will no doubt be much surprised at the sudden diminution in the number of broken steel axles, and attribute it to an improvement in the quality of the material. Many argue that while sudden changes of section may have a deleterious effect on steel axles, yet they do not account for axles breaking in the middle. The number of steel axles which break in this manner is no doubt extremely small; and in the only case of a *car* axle which the writer can recall, the initial crack manifestly started from a very deeply impressed V in the makers' brand stamped on the axle. A few driving axles have been known to break near the centre, but the flaw started from the sharp corner of a keyway for the eccentric. While it cannot be said that there is no mystery about the failures of steel, yet it can safely be asserted that the causes of failure of steel used in locomotive or car construction can in nine cases out of ten be definitely located, and can moreover be prevented by careful design and the elimination of doubtful material by means of constant and systematic tests.

Maximum Average Speed and Capacity of Rapid Transit Trains.

In the *Railroad Gazette* of Dec. 30, 1892, two correspondents discuss briefly the speed and capacity of rapid transit trains on the proposed subterranean road in New York. Since then we have collected data on the subject from some exact records taken on the Chicago & South Side Rapid Transit Railroad's Co.'s elevated road in Chicago, and from these we shall try to answer some of the questions asked, more particularly those pertaining to the distance required to get a train under way and the power necessary to do it.

Diagrams *A*, *B*, *C* and *D* show the speed at different points between stations, the rate of acceleration, the rate of retardation, and the difference in the handling of engines by different engineers. These diagrams give actual records from speed recorders. Diagram *E* shows these records superimposed and illustrates how great is the difference between the handling of the same locomotive by different engineers. Diagram *F* shows the amount of power used by two engineers, A and B, when leaving a station and getting under way. Engineer A being more active and having a better knowledge of his engine, is enabled to use more steam power without slipping the drivers, and therefore makes schedule time, while engineer B loses time with the same train and the same engine and under the same conditions. The foot-tons of energy are given for different distances from the starting point. The foot-tons represent the power exerted on the train by the engine. On any road where there is need for rapid acceleration and great activity on the part of the engineer in order to make the average speed called for the maintenance of schedule time will depend very largely upon the personal equation of the engineers. Even the best engineers for ordinary work may be beaten by less experienced but more active and quick witted ones when both are worked on a fast suburban schedule.

An analysis of these diagrams is given in the table. From it can be learned the time and distance between stations, the average and the maximum speed, the ratio of the average to the maximum speed, the distance to reach maximum speed, the foot-tons of energy necessary to overcome friction, and to accelerate trains and overcome inertia, also the total energy used between stations. Such figures about a fast schedule in rapid transit work have never been published before, and they should be interesting to those of our readers who are connected in any way with the railroads having suburban traffic, or who are interested in rapid transit schemes.

In the calculations to make the table, the stored energy in the wheels of the train is taken from the table published in the *Railroad Gazette* Dec. 23, 1892, for a spoke wheel with a steel tire. Based on this each pound in the wheel has 1⅔ times as much stored energy as one pound in the body of the train. The friction is taken at eight pounds per ton, which is sufficient for well lubricated journals on light cars with 30 in. wheels running on a 90-lb. rail; it is high rather than low. The total train weight is 137 tons, and includes locomotives and cars. The weight on the locomotive drivers is 40,000 lbs. From the table it will be seen that the average speed is about 66 per cent. of the maximum, and apparently this holds for all cases where the distances between stations are not materially greater than those given, and where the engineer is accelerating the train nearly to the point where the brakes are applied for stopping.

The distances in which the stops are made, as shown on the diagrams, vary somewhat, but are exceedingly short as the result of the use of a quick-acting, automatic brake. The braking power used is the same as is given to freight cars, namely, 70 per cent. of the light weight of the car; that is, the pressure on the brake shoes against the wheels is 70 per cent. of the weight of an empty car upon the rails. It is but 48 per cent. of a fully loaded car.

Some of E. A. B.'s questions may be answered by enlarging upon the data given by the diagrams and tables and the following deductions may be taken as fair estimates for E. A. B. to speculate upon: One hundred people can be carried in each suburban car of an eight-car train; but, of course, nearly one-half of the passengers would be obliged to stand up. The weight of the empty car would be about 34,000 lbs. The weight of 100 passengers averages about 14,000 lbs. Total, 48,000 lbs. for each loaded car. A rapid transit train may consist of eight cars provided an automatic brake and strong connections between cars are used, also provided that the necessary weight of motor can be permitted on the rails and roadbed. For an average speed of 15 miles an hour between terminals with an eight-car train, with stations placed about as given in the tables with this, 90,000 lbs. would be required on the drivers, and in addition suitable arrangements would be needed for sanding the track in bad weather.

It would be impossible to run eight-car trains at an average speed of 40 miles an hour including stops, with stations one mile apart, unless some means were provided for giving a rate of acceleration enormously higher than can be obtained from the locomotive just mentioned. This all appears from what follows:

If the ratio of 66 per cent. given in the table will hold good for an average speed of 40 miles an hour *between stations*, then the maximum speed would be about 60 miles an hour; but when the time lost in stopping at stations is included, the necessary maximum speed becomes much greater than this, as will be seen hereafter. Given the maximum rate of acceleration of a steam locomotive weighing 90,000 lbs. on drivers, hauling an eight-car loaded train, the least distance to reach 60 miles an hour would be 3,045 ft. To make a service stop would require about 1,596 ft. So 4,641 ft. might be taken as the minimum distance between stations to gain an average speed of 40 miles an hour between stations, not including time for stopping at stations. At an average speed of 40 miles an hour, this distance would be run in 83 seconds. At least 30 seconds would be required for an eight-car train stand at stations, thus the total time from start to stop would be 113 seconds. This is but at the rate of 28¼ miles an hour average speed from start to start, or between terminals. Thus it is seen that 40 miles an hour average speed between stations is quite a different matter from the same average speed between terminals, including stops.

To find the maximum speed and distance between stations for any given average speed between terminals and any length of stop required at stations, one may use

TABLE GIVING THE RESULTS OF AN ANALYSIS OF SPEED RECORDER DIAGRAMS TAKEN FROM TRAINS RUNNING ON A RAPID SCHEDULE ON AN ELEVATED ROAD.

Diagram.	Line number.	Time between stations. Minutes and seconds.	Distance between stations.	Maximum speed in miles per hour.	Average speed in miles per hour.	Average speed in per cent. of maximum.	Distance run to reach maximum speed. Feet.	Foot-tons of energy used between stations to overcome friction.	Foot-tons of energy stored in train at maximum speed.	Total energy consumed between stations.
A	1	1:40	2,736	28½	18.7	66	1,705	1,806	3,716	5,522
"	2	1:40	2,444	27½	16.7	61	1,613	1,665	3 454	5,119
"	3	1:42	2,610	27	17.6	65	1,540	1,541	3,363	4,904
"	4	1:43	2,723	26½	18 0	68	1,467	1,514	3,202	4,716
"	5	1:42	2,722	29	18.2	63	1,925	1,987	3,843	5,830
"	6	1:33	2,612	30	19.2	64	1,686	1,740	4,192	5,932
"	7	1:47	2,486	30	15.8	53	1,760	1,816	4,192	6,008
"	8	1:32	2,694	31	20.0	65	1,980	2,043	4,405	6,448
"	9	1:45	2,914	32	18.9	59	2,126	2,194	4,678	6,872
B	1	1:04	1,186	21	12.6	60	650	671	2,018	2,689
"	2	1:04	1,376	23	14.7	64	733	756	2,415	3.171
"	3	1:08	1,168	19	11.7	62	675	697	1.644	2.341
"	4	1:12	1,456	21	13.8	66	806	832	2.018	2,850
"	5	1:22	1,622	21	13.5	64	953	983	2,018	3,001
"	6	1:14	1,622	24	15.0	63	1,070	1,106	2,636	3,742
"	7	1:17	1,456	23	12.9	56	1,008	1,040	2,415	3,455
"	8	1:01	1,168	21	13.1	62	752	776	2,018	2,794
"	9	1:07	1,376	25	14.0	61	934	964	2,415	3,379
"	10	1:02	1,186	22½	13.0	58	825	851	2,317	3,168
C	1	1:38	2,681	27	18.7	69	1,485	1,540	3,363	4,903
"	2	1:34	2,585	27½	18.7	68	1,516	1,572	3.455	5,207
"	3	1:33	2,613	28½	19.2	67	1,375	1,426	3,716	5,142
"	4	1:34	2,722	28½	19.8	68	1,375	1,426	3,716	5,142
"	5	1:43	2,722	27½	18.3	67	1,889	1,950	3,454	5,404
"	6	1:44	2,626	25	17.2	69	1,338	1,381	2.850	4,231
"	7	1:42	2,598	25	17.4	69	1,228	1,267	2,850	4,117
"	8	1:17	2,420	27	21.4	79	1,632	1,685	3,363	5,048
D	1	0:55	1,265	23½	15.7	67	832	863	2,374	3,247
"	2	....	[1,361	23	....	..	800	832	2,415	3,247
"	3	1:02	1,155	21	12.7	61	702	728	2,018	2,746
"	4	1:08	1,457	28¼	14.6	62	876	908	3,646	4,554
"	5	1:13	1,622	24½	15.1	62	880	912	2,741	3,654
"	6	1:17	1,622	22½	14 4	64	1,027	1,060	2,317	3.377
"	7	1:12	1,457	20½	13.8	67	880	908	1,914	2,822
"	8	1:02	1,155	20½	12.7	62	670	691	1,914	2,605
"	9	1:10	1,375	21	13.4	64	753	777	2,018	2,795
"	10	1:06	1,250	19	12.9	68	750	774	1,644	2,418

the following approximate formula deduced from the diagrams and tables with this:

The distance in feet to reach the maximum speed is about	$.846\ B^2$
The distance in feet to make a service stop is about	$.38\ B^2 + 3.8\ B$
The distance in feet between stations is about	$1.23\ B^2 + 3.8\ B$
The average speed in miles an hour between stations is about	$.66\ B$
The time in minutes between stations is about	$.022\ B + .066$
The total time in minutes from start to start is about	$.022\ B + .065 + T$
The average speed in miles an hour between terminals is	$\frac{1.93\ B^2 + 3.8\ B}{1.9\ B + 5.7 + 88\ T}$

In which B is the maximum speed in miles an hour between stations, and T is the time in minutes during which the train is at a full stop at stations.

These formulæ contemplate a very high degree of braking force, a high rate of acceleration for steam locomotives and very active work on the part of engineers and train dispatchers. To gain this degree of acceleration the locomotive design must be of the very best.

For an average speed of 40 miles an hour between terminals and one-half minute full stop at stations, the following results are given by these formulæ, which it must be remembered are only approximate, but are based on actual trials of steam locomotives at lower average speeds than 40 miles an hour.

Distance to reach maximum speed	5,297 ft.
Distance required to make a service stop.	2,680 ft.
Distance between stations	8,006 ft.
Average speeds between stations	51.4 miles an hour.
Time between stations	168 3 seconds.
Time from start to start	138.3 seconds.
Maximum speed	79.1 miles an hour.
Average speed between terminals	40 miles an hour.

If, however, electric locomotives were used, the rate of acceleration could be made greater, and it is possible by using a motor of unusual accelerating power that with a maximum speed of 65 miles between stations, an average of 40 miles an hour between terminals could be obtained with 7,000 to 8,000 ft. between stations. That is, it might be expected, owing to the great accelerating power of electric motors, that with a distance between stations, such that a steam locomotive could give an average speed of 40 miles an hour between terminals, with a maximum speed of 79 miles, the electric locomotive could give the same average speed with a maximum of 65 miles an hour. The effect of more rapid acceleration is well illustrated by the service given by cable roads. The rapid acceleration resulting from gripping the cables renders possible an average speed between terminals, including stops at stations close together, of 70 per cent. of the maximum speed, while under the same conditions a steam motor could not make an average speed of 40 per cent. of the maximum.

With stations one mile apart, it is practically impossible with steam locomotives hauling eight-car loaded trains to make an average speed of 40 miles an hour between terminals under the best conditions, even with the best engineers and with locomotives designed with a view to rapid acceleration.

For such work as this only the most powerful braking apparatus could be permitted. It will require, in case of emergency, a distance of 2,200 ft. in which to bring a train to a stop from a speed of 75 miles an hour, and this shows the weak point of any scheme of operation requiring an average speed of 40 miles an hour between terminals with short distances between stations; for, as shown above, the maximum speed with such comparatively short distances would have to be about 80 miles an hour. It would only be safe to run trains on such

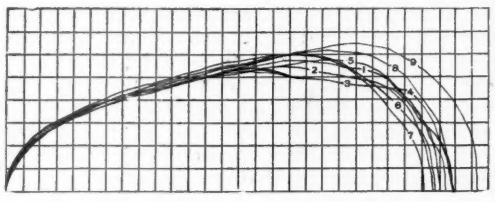

Diagram A.

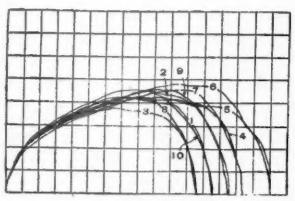

Diagram B.

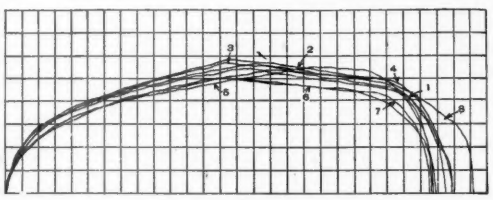

Diagram C.

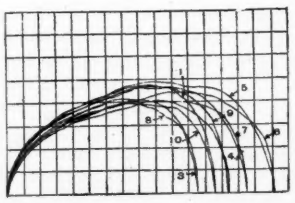

Diagram D.

Diagrams A, B, C and D show various methods of running between stations on a suburban road by different engineers and by the same engineer under different conditions.

fast schedules as we are now considering when an absolute block system is provided with the blocks about five-eighths of a mile long preceding the stations, and there should be no permissive blocking. Now, the effect of a positive block system on a rapid transit road, such as this contemplates, would be to delay traffic seriously whenever the engineers, conductors and guards, and all concerned in the direct operation of the trains, were not working in perfect harmony and with promptness and dispatch. Probably more passengers could be carried per hour by putting a positive block at each station and by placing the stations as close together as could be done and attain the average speed desired. A positive block at stations will not delay trains as much as one between stations, for the reason that at stations it acts merely to hold the train until the preceding one starts from the station ahead, and when the engineer pulls out he is confident of a lear track ahead; but when it is placed between stations, it may check the speed of trains and compels the engineer to run cautiously until the signal point is passed. At an average speed of 40 miles an hour between terminals, the distance between stations could not be less than 8,000 ft.—this for the best steam locomotives specially built would require a maximum speed of about 80 miles an hour. The locomotive with a loaded train would acquire this speed in about 5,300 ft. and would use about 2,680 ft. in which to make a service stop. The time at the stations would need be 30 seconds to handle the passengers. The time from start to start would be about 138 seconds. This plan would require a very large consumption of fuel per mile to haul loaded trains of eight cars. The closest headway in time between dispatching trains would be coincident with the time between leaving stations, or 138 seconds, and the capacity of a double track road would be about 25 trains an hour, which, if filled, would carry 20,000 passengers per hour at a maximum. Whether this is a "drop in the bucket" or not, as suggested by E. A. B., depends upon one's estimate of the passengers who will collect at stations placed about 8,000 ft. apart.

As far as the feasibility of a speed of 40 miles an hour between terminals goes, we have no doubt that there are locomotive builders and electrical companies who are willing to guarantee to accelerate eight-car loaded trains with sufficient rapidity to enable them to make an average speed of 40 miles an hour between terminals with stations 8,000 feet apart, but as this would require an enormous expenditure of fuel, neither the locomotive builders nor the electric companies would be willing to give a guarantee regarding the efficiency of fuel consumption or a guarantee of the coal required per car mile. The introduction of electric locomotives of considerable power will result in increasing the limit of average speed between terminals with the same maximum speed, but just how much this increase will amount to is a matter of speculation when a fair economical efficiency is required of the motors, but where fuel is not a matter of much consideration, a decided increase in average speed can be gained, due wholly to the fact that with the electric locomotives the torque on the driving axles at high speeds can be decidedly increased over and above what is possible with steam engines.

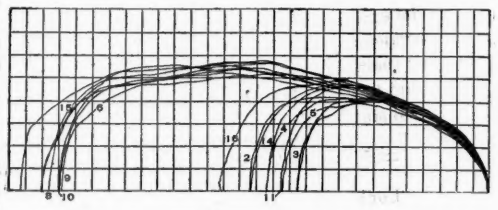

Diagram E.

Superimposed diagrams showing variations in handling suburban engines by different engineers and by the same engineer under different conditions.

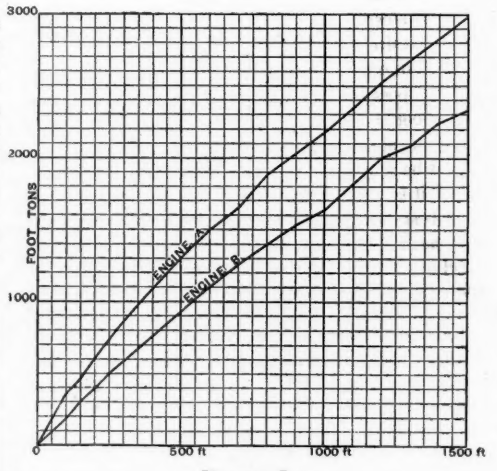

Diagram F.

Showing the comparative power used by two different engineers when handling suburban trains. Engineer A makes trip according to schedule while engineer B loses time.

The foregoing estimates, it should be borne in mind, take into consideration not the ordinary size of engines for rapid transit service, nor the ordinary promptness in handling trains, but contemplate a powerful engine, but, of course, of the ordinary type, with compound cylinders, and the very best superintendence of operation, and active and prompt service on the part of the engineers and dispatchers.

Many who attempt to solve the rapid transit problem try to do too much, and get into a tangle thereby. It is practically impossible to give extremely rapid transit and great capacity on a two-track road without using long sidings to allow through trains to pass the locals. This scheme would be attended by considerable danger because of the unreliability of men and devices for interlocking switches and handling trains. With a four track road the extremely rapid transit desired by some can be obtained, and also the large capacity needed for local trains, but with a two-track road high average speed and large capacity conflict. Setting aside the demands for the very high average speed, and taking a

two track road at its best, something more can be done with it than is generally understood. Take, for instance a scheme contemplating a maximum speed of 60 miles an hour, and an average speed between terminals of 28 miles an hour, with stations placed about 4,600 ft. apart. Now by studying the needs of the traffic and by providing suitable sub terminals, trains of eight cars could be dispatched when needed most, at intervals of two minutes, and could be run at an average of 28 miles an hour without excessive use of fuel or exceeding a reasonable weight of motor. This would give a capacity of 24,000 passengers an hour, without straining to an unreasonable degree either the men or the machinery. By dropping the average speed between terminals still lower, say to 20 miles an hour, and without requiring anything unusual in the way of supervision and dispatch in the handling of traffic, the capacity of the line could be increased to 32,000 passengers an hour with eight-car trains run at 1½-minute intervals. Further, at this comparatively low average speed, it is quite feasible to run 16 cars to a train. This would double the capacity or give 64,000 passengers per hour. Sixteen cars are frequently run per train on the Illinois Central in Chicago for suburban work, and by providing more powerful locomotives, even those trains could be run at an average speed of 20 miles an hour between terminals with stations placed somewhat less than a mile apart. From all this it may be seen that more reasonable demands for speed will give a vastly increased capacity to any rapid transit line.

December Accidents.

Our record of train accidents in December, given in this number, includes 107 collisions, 95 derailments and 10 other accidents, a total of 212 accidents, in which 41 persons were killed and 229 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All of which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	16	..	..	16
Misplaced switch	..	1	4	5
Failure to give or observe signal	6	1	6	13
Mistake in giving or understanding orders	..	9	..	9
Miscellaneous	7	1	11	19
Unexplained	15	10	20	45
Total	44	22	41	107

DERAILMENTS:			
Broken rail	11	Derailing switch	1
Loose or spread rail	5	Bad loading	1
Defective bridge	1	Too sudden application of brakes	1
Defective switch	3	Animals on track	7
Defective frog	1	Landslide	2
Broken wheel	4	Malicious obstruction	4
Broken axle	3	Accidental obstruction	1
Bent axle	1	Unexplained	33
Broken truck	4		95
Fallen brakebeam	2		
Broken drawbar	3		
Misplaced switch	7		

OTHER ACCIDENTS:	
Explosion of car heater	1
Cylinder explosion	1
Car burned while running	2
Various breakages of rolling stock	4
Other causes	2
	10
Total number of accidents	212

A general classification shows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.	P.c
Defects of road	..	21	..	21	10
Defects of equipment	16	17	6	39	18
Negligence in operating	46	10	2	58	28
Unforeseen obstructions	..	14	2	16	7
Unexplained	45	33	..	78	37
Total	107	95	10	212	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.
Passenger	39	38	7	84
Freight and other	160	60	3	223
Total	199	98	10	307

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
KILLED:				
Employés	31	6	..	37
Passengers	1	3	..	4
Others	..	..	..	..
Total	32	9	..	41
INJURED:				
Employés	67	42	1	110
Passengers	55	58	2	115
Others	4	..	..	4
Total	126	100	3	229

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	..	31	..	11
Defects of equipment	..	13	3	2
Negligence in operating	1	53	31	75
Unforeseen obstructions and maliciousness	..	..	3	11
Unexplained	3	16	..	10
Total	4	113	37	109

Twenty-three accidents caused the death of one or more persons each, and 61 caused injury but not death, leaving 128 (60 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with December of the previous five years shows,

	1892.	1891.	1890.	1889.	1888.	1887.
Collisions	107	125	82	90	61	92
Derailments	95	101	111	67	61	83
Other accidents	10	8	14	11	11	7
Total "	212	234	207	168	136	182
Employés killed	37	62	35	44	41	57
Others "	4	23	18	8	5	14
Employés injured	110	172	104	122	73	87
Others "	119	159	79	52	63	124
Passenger trains involved	84	72	90	59	56	79
Average per day:						
Accidents	6.84	7.55	6.68	5.42	4.39	5.87
Killed	1.32	2.74	1.71	1.68	1.48	2.29
Injured	7.39	10.68	5.90	5.61	4.39	6.80
Average per accident:						
Killed	0.193	0.363	0.256	0.309	0.338	0.390
Injured	1.080	1.415	0.884	1.036	1.000	1.159

The worst accidents in December did not result in the death of any passengers, so far as we have learned. The rear collision at Greenville, N. J., on the 8th, which we have heretofore discussed, caused the death of one passenger, one was killed at Carey, O., and two at Husted Col. The worst accident for passengers was the derailment at Hallville, Wyo., on the 12th, where a large number were injured. A local paper says that during the cold snap which prevailed at that time a considerable length of new rails which were laid last summer received their first cold test and that "numbers of them broke like pipe stems."

The most fatal wreck of the month was the rear collision at Nelson, Minn., on the 18th, where seven employés were killed. The cause was an old and common one. A freight train approached a station on a descending grade at uncontrollable speed and the train standing at the station depended upon the approaching engineman to do his full duty and see the caboose red lights while he was yet far off. It is the old problem of enforcing rules where trains are so infrequent that trainmen *will* take chances. It is probable that on a busier road the standing train would have been protected and the approaching train would have been better controlled, regardless of any technical points of discipline, simply because the *chances* of coming out safely, without taking care, would have been poorer. Quite likely the thousands miles of "thin" road on our Western prairies may continue to be successfully operated on the old plan of trusting largely to the "judgment" and intuition of enginemen and conductors—if financial results are alone considered. But as long as legislators and jurymen require human life to be as scrupulously protected in Minnesota as in New York, the chief moral of a collision like this is that discipline and safety regulations should be enforced as thoroughly on a "thin" road as on a heavy one, even if it costs a good deal more per train-mile to do it.

On the Central of New Jersey, Dec. 28, there was a considerable freight wreck, which resulted from a rear collision caused by an engineman going to sleep on his engine, and sleeping so soundly that a brakeman's lantern thrown into the cab window did not disturb him. His defense, as reported in the papers, was that he had been on duty for 30 hours continuously; and, assuming this to be true, a Philadelphia paper speaks of the case editorially, and says that "the fault was with the Superintendent who permitted an engineer to work to the point of exhaustion." There seems, however, to be some doubt about the justice of this judgment. The Superintendent of the road says that the engineman had *not* been on duty 30 hours, or any unreasonable time. Even if he had, this might not be a conclusive defense. It is not likely that a case occurs once a year where an engineman has to work 30 hours with no chance whatever to sleep; these long periods of service always turn out to have been of such a nature that the alleged victim had chances to catch a few short naps. There may be emergencies where a 30-hour period, with these slight intervals, may be justifiable. There are many enginemen whose known reliability makes them better guardians of a train when they have had nothing but 15-minute naps for 30 hours than certain others would be if they had not been overworked for a month. This fact was illustrated by the action of the New York elevated road at the time of the celebration last October, when experienced men were worked long hours because they were preferable to less reliable men however short the hours of the latter might be fixed. On the other hand, the Superintendent's worst difficulty is with men who go to sleep when they have *not* been overworked, and the Central of New Jersey seems to have been afflicted with one of this kind. The Superintendent has to guide himself by a triple rule: he must be careful not to order trains to be run so close together that his dispatchers will be tempted to use undue urgency in asking men to work extra; he must know which of his enginemen are most trustworthy for a long siege in case of necessity; and he must look out for the man who is likely to be sleepy at any time, in consequence of working in a garden, trading horses, carousing o' nights or other uses of the time called his own which impair the value of the time which he sells to the railroad company. This latter is the hardest element in the problem, for there are so many things, less open to criticism even than gardening or splitting kindling-wood, which a man can justify to his own conscience, but which are an unlawful uses of his energies.

There were two serious train accidents in Mexico in December, four persons having been killed on the Mexican Southern, Dec. 22, and a bad butting collision occurring on the Mexican National the 29th. It appears that the outrageously severe laws of that country have come to be very fully appreciated by trainmen; as, in the report of this collision, it is stated that the crews of both trains at once took flight for parts unknown.

One accident in this record is due to the explosion of a car heater. There have been a few others reported, but in each case the car was standing in the yard. From such particulars as have been reported, we judge that most or all of these accidents were due to gross carelessness.

We have seen report of only one electric car accident in December—that at Council Bluffs on the 4th. At Chicago, on the 29th, a short time before sunrise, 20 persons were injured, 4 of them fatally, at the Forty-seventh street crossing of the Pittsburgh, Ft. Wayne & Chicago. A yard engine backed against a street car which was packed full of passengers, who, in consequence of frost on the windows, could see little or nothing outside of the car. There were two attendants at the crossing and it is said that both of them were inside their cabins. In Philadelphia on the 4th an engine of the Philadelphia & Reading smashed a street car and injured 11 persons, one or two of them fatally.

The views of Congressmen on the subject of pooling seem to be greatly at variance, and the House Committee on Interstate Commerce has prepared a bill entirely independent of that heretofore reported in the Senate. This House bill permits pooling, but Mr. Lind, of Minnesota, and Mr. Mallory, of Florida, make a minority report, saying that they feel in duty bound to protest against the pooling section of the bill. It is, they say, the first measure that has ever received the sanction of a committee of the House to make legal and enforceable at law contracts for the division of traffic. It proposes to legalize railroad wrecking and stock speculations by authorizing not only agreements for the division and apportionment of net and gross earnings among the carriers themselves, but also authorizing the carriers to divide and apportion these among "others" not carriers. Under these provisions stockholders will be as much at the mercy of railroad managers as will the public. The Standard Oil Company, the Dressed Beef Combine and other monopolies can obtain rebates by contracts enforceable in the courts instead of by stealth and concealment as heretofore. It is held to be unfair to the Interstate Commerce Commissioners to submit them to the importuning and pressure that this bill will, should it become a law. The Senate Committee has reported the Cullom bill, but without the pooling clause, the consideration of which has been postponed.

Bills affecting railroads are now being presented to the state legislatures so plentifully that it is difficult to keep track of them. Perhaps most readers will have no great desire to keep track of them, as they are so numerous and generally so ill-considered that only those persons directly affected will feel an interest in them, as long as they do not become laws. The usual number of railroad bills is from 20 to 50 in some legislatures, and we judge that the present season is likely to fully maintain the average. Most of the bills reported during the past week are likely to amount to nothing at all, but some of them will be important if enacted. We will briefly mention the principal ones, taking them in the order of the states alphabetically:

In Arkansas a bill for the supervision and regulation of railroads and the appointment of three railroad commissioners has been presented. In California the Traffic Association's bill to abolish the railroad commission has been introduced in both houses. It aims to amend the constitution so as to empower the legislature to fix rates and fares. It provides that for passengers not more than two cents a mile shall be charged. For freight and merchandise the charges are specified in what is called the "California distance tariff," the classification being that adopted and issued by the Western Classification Committee. In Massachusetts there is a proposition to prohibit free passes except to employés and persons riding in charge of animals. Massachusetts passed a law last year forbidding state officers to receive free passes, and one like it is proposed in Michigan this year. In Minnesota a bill has been introduced to put country elevators under the supervision of the railroad commission. It will be remembered that this has been a troublesome subject in the northwestern states for two or three years. In Missouri a law is proposed to increase the liability of railroads and other corporations in cases where employés are injured by the act of fellow servants. In New Hampshire they want to compel the railroads to issue 500-mile tickets at two cents a mile. In the New York Legislature Thomas Finegan has offered a bill to make the fares on the New York elevated roads three cents during the morning and evening hours. Another bill aims to make a five-cent fare carry a passenger through over the Manhattan and Suburban elevated roads, the latter being now controlled by the former. The proposition to compel the use of automatic couplers on freight cars is also up at Albany. In North Dakota there is a warehouse bill having the same general object as that in Minnesota. In Ohio a law requiring the flagman of a passenger train to have had two years' experience as freight brakemen has already passed the lower house. Another, already passed, is one requiring the lighting of passenger cars by gas, electricity, or other "material" approved by the railroad commis-

sioner. In South Dakota it is proposed to compel the railroads to furnish every shipper with all the empty cars he wants, within five days after he makes the demand. The roads must also provide ample warehouse room at every station, and do other impossible things.

The severe weather of the past ten days has caused the usual difficulties in railroad operations, and the press dispatches have been filled with accounts of delays, together with some suffering and a few serious train accidents. The greatest inconvenience has been in Pennsylvania, New Jersey and the states further south, the railroads in this region being unprepared for cold weather and snow. In the neighborhood of Philadelphia the snow was so deep that it scared the natives. On the Pennsylvania Railroad, near Ebensburg, Pa., a passenger train was stuck in the snow all night. The engineman and fireman were badly frozen, and the passengers are said to have suffered greatly. Ferryboats in New York harbor were much delayed by floating ice, and similar trouble was experienced at Philadelphia. Even at Norfolk, Va., the passenger steamers were much delayed by the ice, and some of them were frozen fast. Near Story City, Ia., a snow plow ran into a passenger train at high speed and a half-dozen passengers were injured, apparently a small number judging by the details given of the collision. At Morning Sun, Ia., on the 13th a passenger car containing eight passengers was overturned on a high trestle and two or three passengers were killed; in Chicago, on the same day, a rear collision on the Chicago & Western Indiana, at Fifty-fifth street, caused the injury of 18 passengers. These last two accidents appear to have been only indirectly due to the cold weather. Scarcity of coal is reported from many places. Chicago was short of soft coal and even Philadelphia has been unable to get anthracite for domestic uses fast enough. The Reading road is said to be so badly blocked, every side track being full, that the snow interfered with train movements much more than it would under normal conditions. The Pennsylvania, whose main line is always full of trains, had to reduce the loads of the freight trains and thus found itself hampered by incipient blockades at many places.

NEW PUBLICATIONS.

Poor's Handbook of Investment Securities. A Supplement to "Poor's Manual of Railroads." Third Annual Number; to July, 1892. 986 pages. New York: H. V. & H. W. Poor, 70 Wall street; London: Effingham Wilson, Royal Exchange.

This book contains, in a compact form, statistics and other information of securities issued by the United States, by the several states and municipalities, by the railroad companies and by other corporations, together with a statement of the condition of the banks of 20 leading cities. This volume has increased in size over the second by 478 pages, or 94 per cent. The corporate bodies described as issuing obligations number 2,666, but in this total are not included the securities of the United States, the several states and territories, and the railroad companies.

The table of contents is too long for us to give except in a concise abstract. Part I. treats of the debts of the United States, of the several states, and of the chief cities, towns, and counties in each state; this covers 334 pages. Part II. is a very concise summary of railroad returns taken from "Poor's Manual." In tabular form there is given a statement showing for a series of years the mileage owned and operated, the capital accounts, statistics of traffic movement, of earnings, and of payments from revenue of the leading railroads of the country. This table covers 20 pages. Part III. shows the amount of capital stock and the rate of dividend paid during eight years by the railroads, with dates and places of payment; and Part IV. shows dates of payment and rates per cent. of the dividends of leading railroads for various periods from the beginning of their corporate existence. Then follow tables showing dates and places of annual meetings, lists of bond coupons, lists of transfer offices and the like for railroad securities, which bring the volume up to page 527. Part X., which fills 126 pages, gives bank statements showing date of charter, financial condition, dividend record, names of directors and officers of national and state banks and trust companies in 20 principal cities. Part XI. shows the range of stock and bond values for four years and a half for the more active stocks and bonds listed on the New York, Boston, Philadelphia and Baltimore exchanges. This division is very complete, presents the information in several forms and occupies nearly 200 pages. Then follow lists of securities listed on the New York Stock Exchange, and these are followed by a synopsis of the condition of a great number of miscellaneous corporations.

TRADE CATALOGUES.

Price List of Improved Hydraulic Jacks, Screw Lever Jacks, etc.—Watson & Stillman, Proprietors, "W. & S." Hydraulic Machinery Works, New York City.

The little pamphlet issued by this concern contains a description of the improved hydraulic jack with a sectional view showing all the working parts, and directions for care and use. Price lists are given for a great variety of jacks suited to railroad and other use. We have frequently illustrated the special railroad tools made by this house, which are remarkable for ingenuity, compactness and excellence of design. Screw jacks are also shown in considerable variety.

The Hollenback Frog & Switch Co., Bort Building, Chicago, sends a catalogue of frogs, switches, crossings and switch fixtures. The company has some specialties. One of these is a patent frog of the clamp type. It is claimed that this clamp is so constructed that no strain is brought on the bolt or nut. Another is an automatic, balance-lever, switch stand, applicable to both split and stub switches. The catalogue also shows a safety switch in which the main line rail is unbroken. The chief peculiarity of this consists in the fact that the unbroken rails are sprung by the action of the switch lever to contact with the turn-out rails, which are spiked in fixed position. A solid steel crossing with an improved joint is also shown.

The Bush Cattle Guard Co., of Kalamazoo, Mich., sends us a little pamphlet as a souvenir of the excursions of the Roadmasters' Association of America. The pamphlet gives two views of the Bush cattle guard and a number of pictures from photographs taken on the excursions.

Prospects of Railroad Building in 1893.

(*Continued from page 49.*)

West Virginia.

Baltimore & Ohio.—From Morgantown north to Point Marion, at state line, and to Smithfield, Pa., 21 miles; grading nearly completed; tracklaying delayed by erection of bridges; track from Smithfield north to Uniontown, Pa., 10 miles, was laid in 1892. The contractors are Bennett & Talbot, Greensburg, Pa.; Langhone & Allen, Richmond, Va.; P. H. Bennett, Fairmount, W. Va., and Lane Brothers & Co., of Baltimore, Md. W. T. Manning, Baltimore, Md., Chief Engineer.

Cairo & Kanawha Valley.—Millon Trestle, near Hughes River, to Parkersburg road, 5 miles; being built by day labor. H. S. Wilson, Parkersburg, W. Va.

Charleston, Clendennin & Sutton.—End of track near Charleston, through Clay County, about 40 miles, under construction. Chas. K. McDermott, Charleston, W. Va., Chief Engineer.

Chesapeake & Ohio.—On Gauley branch, Gauley to 20 Mile Creek, 9 miles, and on Keeny Creek branch from Nuttall, 6 miles, grading about completed on both lines Tracklaying will be started as soon as weather permits on south side branch along New River from Rush Run; grading about half completed on last 5 miles. From Keeney's Creek to Withrow's Mills 6 miles, and from Thurmond to coal mines on Loup Creek, 10 miles, under contract. C. D. Langhorne, Richmond, Va.; J. C. Carpenter, Clifton Forge; G. G. Gooch, Staunton, Va., contractors; H. Frazier, Richmond, Civil Engineer.

Coal River Valley.—Under survey, St. Albans, on the Coal River, to Peytonia, with a branch to Boone Court House, 50 miles. Wm. C. Reynolds, Chief Engineer, Charleston, W. Va.

Fairmount Belt.—About 6 miles of belt road at Fairmount, W. Va., T. J. Steers & Co., contractors. The Baltimore & Ohio will operate the road when finished. O. S. McKinney, Secretary, Fairmount, W. Va.

Kanawha & Elk River.—Kelly's Creek to Kanawha County, 12 miles; some work done in 1892. David Ward, Detroit, Mich., President.

Kanawha & Michigan.—From Malden to Gauley River, 32 miles, to connect with a branch of the Chesapeake & Ohio; grading now nearly completed. J. S. Casement, of Painesville, O., has the contract. J. C. Williams, of Charleston, W. Va., Chief Engineer.

Pennsylvania Lines.—New Cumberland to point opposite Liverpool, O., on New Cumberland Branch, 9 miles, nearly graded. M. J. Becker, Pittsburgh, Pa., Chief Engineer.

Pittsburgh, Washington & Southern.—Location made for 33 miles, balance of line projected. T. M. Jackson, Clarksburg, W. Va., President.

Powellton & Pocahontas.—About 5 miles surveyed near Powellton, and will be built soon. Evan Powell, President, Powellton, W. Va.

West Virginia & Pittsburgh.—Camden on Gauley, south to Cherry River, 9 miles, projected. J. A. Fickinger, Chief Engineer, Weston, W. Va.

Wheeling Bridge & Terminal.—Wheeling to Benwood, O., 3 miles. C. O. Brewster, 261 Broadway, New York City, President.

Wheeling & Connellsville.—Wheeling east to Uniontown, 75 miles; surveys completed in 1892. J. Abbott, 150 Broadway, New York City, Chief Engineer.

North Carolina.

Asheville & Craggy Mountain.—Near Asheville to Summit Mountain, 2 miles, located. W. B. Guryn, Asheville, N. C., President.

Brunswick, Western & Southern.—Southport north to Wilmington, 20 miles; some work done in 1892. W. G. McRae, Wilmington, N. C., Chief Engineer.

Carolina Mining & Mfg. Co.—Sylvia to Webster, 4 miles; partly graded in 1891. W. M. Cocke, Jr., Asheville, N. C., President.

Laurel River & Hot Springs.—Hot Springs to Gahagen, 7 miles; S. H. Wheaton, Hot Springs, N. C., Contractor; 24 miles additional projected. George H. King, Lynn, Mass., General Manager.

Linville Improvement Co.—Survey being made south to Morganton, N. C.; survey also made Linville north to Cranberry, 5 miles. S. T. Kelsey, Linville, General Manager.

Norfolk, Aloemarle & Atlantic.—Jackson to Albemarle, 35 miles; surveyed in 1891. George S. Jones, New York City, President.

Oxford & Coast Line.—From Oxford to Dickinson's, 41½ miles; grading finished. J. T. Pinden, contractor, Oxford, N. C.; A. A. Chapman, Chief Engineer, Oxford, N. C.

Wilmington, Onslow & East Carolina.—End of track near Wilmington northeast to New Berne, 23 miles; about 18 miles graded. H. A. Whiting, General Manager, Wilmington, N. C.

South Carolina.

Jonesville & Lockhart Shoals.—Jonesville to Lockhart Shoals, 16 miles; surveys about completed and contract to be let soon. C. D. Farrar, Union, S. C., President.

Pickens.—Easley to Pickens, 9 miles, graded. Julius E. Boggs, Pickens, S. C., President.

Georgia.

Atlanta Elevated.—Elevated road in Atlanta; right of way not yet settled; contracts may let in February. H. T. McDaniel, Atlanta, Ga., Chief Engineer.

Boston & Albany.—End of track at Dot, north to Moultrie, 9.5 miles, under construction, work being done by day labor, and will be completed by March 1. C. W. Pidcock, Superintendent, Round Lake, Ga.

Dover & Statesboro.—Statesboro to Jessup; projected. R. D. Curry, Statesboro, Ga., Assistant Superintendent.

Macon, Dublin & Savannah.—Dublin east to Savannah, 110 miles, projected and partly located. James T. Wright, Macon, Ga., General Manager.

Middle Georgia & Atlantic.—Machen northwest to Covington, 25 miles, graded in 1891; track will be laid shortly. Also graded from Newborn on this line north to Social Circle, 10 miles. Projected from Eatonton west to Savannah, Ga., about 170 miles, partly located in 1892. Arthur Pew, Savannah, Ga., Civil Engineer.

Millen & Southern.—Twenty miles between Stillmore and Lyons projected. J. W. Preston, Millen, Ga., General Manager. L. R. Millen, 16 Beaver street, New York City, President.

South Bound.—Savannah south in a very direct line to Hart's road, near Jacksonville, Fla., where connection is made with the Florida Central & Peninsular, which leases the road. The distance is 114 miles. Southern Suppiy Co., of which I. Y. Sage, of Atlanta, Ga., is President, has the contract and has just begun work. W. S Greene, of Jacksonville, is Chief Engineer. New York office is at 32 Nassau street.

Florida.

Arcadia, Gulf Coast & Lakeland.—Lakeland southwest to Braidentown, 67 miles under contract; stated that grading will begin again in the spring. K. B. Harvey, Punta Gorda, Fla., Chief Engineer.

Atlantic & Western of Florida.—Blue Springs to Ocala, surveyed. E. R. Chapman, New York City, President.

Carrabelle, Tallahassee & Georgia.—About 10 miles of track laid in 1892 from Ocklocknee River near Carrabelle; 10 miles additional to Lost Creek nearly graded. John H. Davidson & Co., Thomasville, Ga., contractors Line surveyed between Tallahassee and Thomasville, Ga., about 60 miles. W. A. Simmons, 29 Broadway, New York, President.

Gainesville, Rocky Point & Micanopy.—Gainesville to Micanopy, 12 miles, partly graded; work suspended. A. J. Shuford, Micanopy, Fla., General Manager.

Jacksonville, St. Augustine & Indian River.—Extension of line to Indian River built in 1892 from Rockledge south to Melbourne, 24 miles. Preliminary survey about completed. C. O. Haines, Titusville, Fla., Chief Engineer.

Pensacola & Northwestern.—Locating survey made for 100 miles from Pensacola, Fla.; line projected to Eutaw, Ala., 220 miles. S. N. Van Praag, Pensacola, Fla., President.

South Florida.—Inverness north to High Springs, surveyed.

Wekiva, Bronson & Northwestern.—Bronson, northwest to Franklin, 35 miles, under construction; being built by Suwannee River Phosphate Mining Co.; construction to be resumed in February. Charles P. Turner, Judson, Fla., Manager.

Alabama.

Atlanta & Selma Air Line.—Atlanta to Selma, 200 miles; all surveyed, and right of way secured. L. E. O'Keefe, Atlanta, Ga., Secretary.

Gulf Red Cedar Co.—Greenville toward Alabama River, 11 miles; grading completed and tracklaying begun. W. H. Parrish, Greenville, President.

Gurley's & Paint Rock Valley.—Gurley's to Paint Rock Valley, 30 miles; 5 miles completed in 1891; nothing now doing. Frank Gurley, Gurley, Ala., President.

Isbell & Iron Mountain.—Isbell to Iron Mountain, 6 miles; partly graded in 1892; contract let; no work in progress. John E. Isbell, Isbell, Ala., Chief Engineer.

Mobile, Tuscaloosa & Florida.—Preliminary survey made in 1892 by John A. Milnor, of Birmingham, through Western Alabama from Tuscaloosa to near Mobile, 350 miles.

Montgomery, Hayneville & Camden.—Partly graded from Camden, east for 11 miles; new contract will be awarded; line surveyed from Camden, northeast to Montgomery. S. D. Bloch, Camden, Ala., President.

Montgomery, Tuscaloosa & Memphis.—Montgomery, northwest to Tuscaloosa, 105 miles; partly graded in 1891; reported that work will be resumed in 1893. J. M. Woolfolk, Montgomery, Ala., Secretary.

Ohatchie Valley.—Will probably be extended 8 miles to Burke Iron Mountain in March; projected from Laney to Birmingham, and end of track to Piedmont, 78 miles. P. S. Fitzgerald, Gadsden, Ala., Civil Engineer.

Tennessee River, Ashville & Coosa.—Tennessee River to Ashville, 10 miles; located in 1891; no work now being done. T. M. T. McKennan, Ashville, Ala., Chief Engineer.

Tennessee.

Bristol, Elizabethton & North Carolina.—From present terminus of line built in 1892 at Elizabethton to Mountain City, 40 miles; surveyed some time ago. George S. Bruce, Bristol, Tenn., Chief Engineer.

Charleston, Cincinnati & Chicago.—Work suspended for last two years, but it is expected to resume operations by March next. A. N. Molesworth, Johnson City, Tenn., Superintendent.

Harriman Coal & Iron.—Emory River at Harriman north to the Brushy Mountain coal fields, 14 miles. William Kenefick, of Kansas City, contractor; J. A. Fairleigh, Harriman, Chief Engineer.

Nashville, Chattanooga & St. Louis.—Pikesville to coal mines, 3 miles, surveyed. Hunter McDonald, Nashville, Chief Engineer.

Nashville & Knoxville.—Algood east to Standing Stone, 13 miles, under construction; projected from Standing Stone to junction with Cincinnati Southern Railroad, 40 miles. R. J. Moscrip, Cooksville, Tenn., Chief Engineer.

Paducah, Tennessee & Alabama.—Projected from Lexington south to Florence, Ala. N. R. Alcott, Lexington, Tenn., Chief Engineer.

Tennessee Midland.—Perryville east to Nashville, 85 miles, projected. N. R. Olcott, Lexington, Tenn., Chief Engineer.

Watauga Valley.—South Watauga to iron ore mines, 5 miles, partly graded. J. R. Englebert, South Watauga, Tenn., Chief Engineer.

Kentucky.

Altamont & Manchester.—Near Altamont east to Manchester, 19 miles, partly graded; company doing construction work. A. M. Crooke, Secretary, Altamont.

Kentucky Midland.—Frankfort to Louisville, 10 miles; Paris, the present terminus, southeast to Morgan County, 50 miles, surveyed. George B. Harper, Frankfort, Ky., General Superintendent.

Owensboro, Falls of Rough & Green River.—Between Rough Creek and Adams Fork, 7 miles, three miles of track laid in 1892, balance now being built. M. B. Mann, Vice-President, Owensboro.

Richmond, Nicholasville, Irvine & Beattyville.—Irvine east to Beattyville, 35 miles, partly graded before the receivership, work now suspended. Jno. McLeod, Louisville, Receiver.

SOUTHWESTERN STATES.

Louisiana.

Kansas City, Watkins & Gulf.—Projected from Lake Charles south to the Gulf of Mexico, about 35 miles. P. H. Philbrick, C. E., Lake Charles, La.

New Orleans, Fort Jackson & Grand Isle.—Present end of track south 12 miles to Grand Isle. J. S. Landry, New Orleans, Superintendent

New Orleans & Northwestern.—Rayville north to Collins, 18 miles, surveyed.

Southern Pacific, on Iberia & Vermilion.—Thibedeaux to Labadu, 9 miles; Chaneyville to Gravel Hill, 16 miles, projected. E. B. Cushing, Houston, Tex., Engineer.

Arkansas.

Hot Springs & Mountain Valley.—Twelve miles, now under survey; will be built and in operation by March 1. Z. Ward, Jr., Little Rock, Ark., General Manager.

Hoxie & Pocahontas.—Hoxie north, via Pocahontas, to the state line, 35 miles, under contract to Pocahontas and a few miles graded. R. D. Moran, Hoxie, Ark., Secretary.

Pine Bluff & Eastern.—English to Gillett and St. Charles, 40 miles, projected. John J. Martin, Pine Bluff, Ark., Chief Engineer.

Prescott & Northwestern.—Branch of two miles from near end of track at Centre. B Whitaker, President, Texarkana, Tex.

Springfield, Yellville & White River.—Winnerva to Yellville, 24 miles, under contract; projected, Yellville west to Harrison, Ark., and to Springfield, Mo., 110 miles. D. W. Pike, Kansas City, Mo., Chief Engineer

Stuttgart & Arkansas River.—From Darell, end of track laid in 1892, south to Gillett, 8 miles, under contract. F. M. Gillett, President, 3 Wall street, New York City.

Ultima Thule, Arkadelphia & Mississippi.—End of track to Ouachita County line, 10 miles, under contract; Ouachita County line to Millville, on St. Louis S. W. R. R., projected. N. S. Woods, C. E., of Arkadelphia, is the contractor.

Missouri.

Greenfield & Northern.—Greenfield north to Stockton, 20 miles; Aurora, southeast to Galena, 20 miles, projected.

Missouri, Kansas & Eastern.—End of track at Cedar City west along Missouri River to Franklyn, 34 miles, under construction, will be completed by March 1. Henry & Balch, of Minneapolis, contractors; R. P. Van Deusen, Jefferson City, Chief Engineer.

Missouri Southeastern.—End of track at Aquilla, to Bloomfield, 4 miles, under construction, being built by company's forces. G. H. Crumb, General Manager, Ardeola, Mo.

St Louis, Cape Girardeau & Fort Smith.—Puxico southeast to Poplar Bluff, 20 miles, surveyed, work not yet begun. Louis Houck, Cape Girardeau, President.

St. Louis, Kennett & Southern, on Pemiscot R. R.—Kennett east to Caruthersville, 24 miles, some grading done. Louis Houck, Cape Girardeau, Mo., President.

St. Louis, Keokuk & Northwestern.—Building into St. Louis to give the Chicago, Burlington & Quincy a new entrance into that city; track laid in 1892 from Cuivre Junction, about 20 miles, toward the bridge over the Missouri River at Bellefontaine Bluffs; track being laid to bridge site, 12 miles from end of track. R. M. Quigley & Co., of St. Louis, contractors. From Bellefontaine Bridge to St. Louis is 12 miles. L. F. Goodale, St. Joseph, Mo., Chief Engineer; E. M. Gilchrist, St. Charles, Mo., Resident Engineer.

Texas.

Bridgeport & Decatur.—Decatur, to Bridgeport, 14 miles, surveyed, and road likely to be extended to coal fields in 1893. Abraham D. Locke, Decatur, Tex., Secretary.

Chicago, Rock Island & Pacific.—End of track at Bowie, south toward Fort Worth, surveyed, 50 miles, contract to be let soon. R. W. Day, Topeka, Kan., Prin. Asst. Engr.

Georgetown & Granger.—Grading finished last spring from Georgetown to Granger, 15 miles; the Missouri, Kansas & Texas has been asked to complete the line. E. Taylor, Georgetown, President.

La Porte, Houston & Northern.—La Porte north to Harrisburg, near Houston, 16 miles, graded track will be laid very soon. Harrisburg to Clear Creek, 8 miles, location being made. C. G. Woodbridge, La Porte, Tex., Chief Engineer.

Missouri, Kansas & Texas.—End of track near Brazos River east to Houston, 19 miles. Burkitt, Burns & Co., Houston, contractors; F. W. Fratt, Houston, Chief Engineer.

South Galveston & Gulf Shore.—End of track, through South Galveston, 5 miles under construction. George J. Gray, Galveston, Tex., President.

Texas Central.—Ross into Waco, 11 miles, and branch to Thurbor coal fields, 30 miles, projected. C. Hamilton, Waco, General Manager.

Texas, Sabine Valley & Northwestern.—From Carthage, 2 miles, work being done by company; Carthage, 30 miles, projected, may be built in 1892. T. J. Evans, Longview, Tex., General Manager.

Velasco Terminal.—Angleton to Arcata Junction, 20 miles, projected. Wm. D. Lee, Velasco, Tex., Vice-President and General Manager.

Indian Territory.

Choctaw Coal & Railway Co.—South McAlester, west to Oklahoma City, 121 miles, projected. J. D. Bradford, Manager, South McAlester, Ind. Ter.

Colorado.

Colorado Midland on Cripple Creek.—Branch from Divide, north to Midland, 8 miles, under construction. B. K. Bryant, Colorado Springs, Col., Chief Engineer and Superintendent.

Crystal River.—End of track at Crystal River crossing near Carbondale to mouth of Coal Creek, 12 miles, and to Coal Basin 12 miles further. Orman & Crook, Pueblo, contractors, Surveyed from Coal Creek to Crystal and Yule Creek, about 22 miles J. A. Kebler, Denver, General Manager, and T. H. Wigglesworth, Civil Engineer, Carbondale, Col.

Elk Mountain.—Near Glenwood to mines near Robinson Lake, 31 miles, construction begun last year; little work done last few months. M. J. Keck, Wilkes-Barre, Pa., President.

Pueblo, Gunnison & Pacific.—Pueblo, south to Walsenburg and San Luis Valley, 120 miles; located in 1891 by H. R. Holbrook, Pueblo, Chief Engineer.

Rio Grande Southern.—Four lines were surveyed in 1891 and 1892 from the main line at Mancos, Col., and other points, southerly to the San Juan River in the vicinity of the recently discovered gold mines; the location will be revised at once. Otto Mears, of Denver, is President and C. W. Gibbs, of Ridgeway, is Chief Engineer.

Union Pacific, Denver & Gulf.—Louisville, westerly to Allen Bond coal mine, 4 miles, under construction. Wm. Ashton, Denver, Division Engineer.

New Mexico.

Mexican Northern Pacific.—Fifty miles of grading finished south of Deming to Mexican boundary; rails shipped from England and tracklaying to begin in Deming, N. M., shortly; company recently reorganized, and it is reported new capital secured. Huss, Townsend & Co., Chicago, contractors.

Arizona.

Santa Fe, Prescot & Phœnix.—End of track near Ash Fork, south to Prescott, 60 miles; Prescott south to Phœnix surveyed. G. W. Vaughn, Prescott, Ariz., Chief Engineer.

Utah.

Great Salt Lake & Hot Springs.—Bountiful to Farrington, 6 miles, located; preliminary survey completed to Wyoming state line, 130 miles. H. S. Joseph, Salt Lake City, Chief Engineer.

NORTHWESTERN STATES.

Iowa.

Burlington, Cedar Rapids & Northern.—End of track 31 miles west of Forest City, to Armstrong, 15 miles, under contract. H. F. White, Chief Engineer, Cedar Rapids, Ia.

Illinois & Iowa Terminal.—Davenport, north to Clinton, 38 miles; preliminary surveys made in 1892. G. T. Baker, Davenport, Ia., Chief Engineer.

Nebraska.

Yankton, Norfolk & Southwestern.—Osmond, opposite Yankton, S. D., southeast to Norfolk, 25 miles graded in 1892. H. E. Eller, Yankton, S. D., Secretary.

Minnesota.

Brainerd & Northern Minnesota.—Ninety miles projected north from present end of track near Gardner toward Leech Lake. Ray W. Jones, Minneapolis, Minn., General Manager.

Duluth & Iron Range.—Branch from Merritt Junction to Mesaba, 12 miles. Winston Bros., of Minneapolis, contractors. R. Angst, Chief Engineer, Duluth.

Duluth, Mesaba & Northern.—From main line, near Stony Brook, to West Duluth, 26 miles, under survey. C. H. Martz, Chief Engineer, Duluth.

Duluth, Mississippi & Northern.—Extension of main line and on lumber branches, 10 miles. W. A. Dafter, Chief Engineer, Swan River, Minn.

Duluth Transfer.—Duluth to Fond du Lac, 10 miles, under contract; 10 miles of additional line near Duluth projected. Day K. Smith, President and General Manager, Duluth.

Mankato & Northeastern.—Mankato, northeast to Hastings, survey completed and right of way nearly secured: work will probably soon commence. P. K. Carney, Mankato, Minn., President.

Port Arthur, Duluth & Western.—Gunflint iron mine, at International boundary line, to iron mines at Ely, 25 miles. R. A. Hazlewood, Port Arthur, Ont., Chief Engineer.

South Dakota.

Black Hills Central.—Rapid City to Wyoming State Line, 63 miles; some surveying done. Henry E. Bailey, Rapid City, S. D., Vice-President.

Dakota, Wyoming & Missouri River.—End of track, near Rapid City, to Mystic, 33 miles, under contract to C. D. Crouch; surveyed, Mystic to Missouri River, 70 miles. W. T. Coad, Rapid City, President.

Duluth, Pierre & Black Hills—Faulkton southwest to Blunt, near Pierre, 60 miles; located, road graded Aberdeen southwest to Faulkton.

Sioux City, Madison & Northern.—Garretson to Madison, 37 miles; surveys made. T. P. Gere, Sioux City, Ia., Vice-President.

North Dakota.

Minneapolis, St. Paul & Sault Ste. Marie.—End of track laid in 1892 at Cathay to International Boundary, 180 miles, under contract; work will be resumed as soon as weather permits. W. W. Rich, Minneapolis, Minn., Chief Engineer.

Watertown, Sioux City & Duluth.—Watertown to Wahpeton, 100 miles; projected. Nothing done for a long time. George W. Carpenter, Watertown, Chief Engineer.

Montana.

Helena, White Sulphur Springs & Castle.—Helena southeast to Castle Mines, 113 miles; surveyed in 1892. W. A. Haven, Helena, Mont., Chief Engineer.

Idaho.

Idaho North & South.—De La Mar, in South Dakota, through Idaho, over 150 miles. J. F. Curtis, President, Boise C., Idaho.

PACIFIC STATES.

California.

California & Nevada.—Surveyed from Bryant to Walnut Creek, 13 miles, and work just begun. J. A. Burton, San Francisco, Secretary.

Southern Pacific.—Santa Margarita south to San Luis Obispo 16 miles. George Stone & Co., San Francisco, Contractors. This is the first section of the proposed new coast line to Ellwood, 110 miles; all surveyed some time ago. William Hood, San Francisco, Chief Engineer.

Oregon.

Coos Bay, Roseburg & Eastern.—From Coquille River west to Roseburg, 65 miles; projected, of this 27 miles has been located, and preliminary survey made in 1892 for balance of line. W. Z. Earle, Chief Engineer, Marshfield, Or.

Rogue River Valley.—Medford to Eagle Pass, 12 miles; projected. J. S. Howard, Medford, Or., Chief Engineer.

Sinslaw & Eastern.—Eugene to Florence, 59 miles; location begun in 1892. Alfred Kirkland, Seattle, Wash., Chief Engineer.

Sumpter Valley.—Sixty miles projected from Baker City, to reach timber tracts. Joseph West, Baker, Or., Superintendent.

Washington.

Bellingham Bay & Eastern.—Four miles projected from New Whatcom to Lake Whatcom. J. J. Donovan, New Whatcom, Wash., Chief Engineer.

Everett & Monte Cristo.—About 15 miles of track laid in 1892 from Lowell east to Everett and east from Hartford Junction; line now under construction through cañon of the Stillaguamish River to Monte Cristo, about 48 miles from Lowell or Snohomish. Henry & Balch, Seattle, contractors; S. B. Fisher, Snohomish, Chief Engineer.

Portland & Puget Sound.—Seattle and Tacoma south to Portland, Or., surveyed and partly graded in 1891. Projected as a joint line of the Union Pacific and Great Northern.

Shelton Southwestern.—Six miles; surveyed through Mason County. Edwin E. Crowell, Shelton, Wash., Secretary.

Spokane Falls & Northern—Northport north to International Boundary, 10 miles, under construction. E. J. Roberts, Chief Engineer, Spokane, Wash.

Washington Southern.—Five miles under construction near Shelton, considerable new work projected. J. B. McDonald, Seattle, President.

CANADA.

New Brunswick.

Tobique Valley.—End of track near Red Rapids, east to Plaster Rock, 14 miles. Lawlor, Connor & Co., contractors, Andover, N. B. Frank Lawlor, Andover, N. B., Chief Engineer.

Nova Scotia.

Nova Scota Central.—Present northern terminus to Margaretville on Bay of Fundy, nine miles C. O. Foss, Bridgewater, N. S., Chief Engineer.

Terminal City.—Mulgrave to Terminal City, 7 miles, surveyed. C. W. Locklin, Secretary, 31 Milk street, Boston, Mass.

Quebec.

Lower Laurentian.—Extension from Grandes Piles south to Three Rivers, 31 miles, surveyed in 1891. L. R. Lathrop, Quebec, Chief Engineer.

Orford Mountain.—Kingsbury north to Richmond, 26 miles, surveyed.

Quebec & Lake St. John.—End of track west of Chambord, to Chicoutimi, 51 miles, under construction, to be finished by July. E. A. Hoare, Quebec, Chief Engineer.

Quebec, Montmorency & Charlevoix.—St. Anns west to Cap Tourmente, 10 miles, under contract. E. A. Hoare, Quebec, Chief Engineer.

United Counties—St. Hyacinthe to Sorel, 32 miles, surveyed. C. D. Mange, President.

Ontario.

Bay of Quinte Railroad & Navigation Co.—On Kingston, Napanee & Western, Harrowsmith to Sydenham, 5 miles, being graded. E. W. Rathbun, Deseronto, Ont., President.

Grand Trunk.—Glencoe north to Kingcourt, 22 miles, contract let in 1892. J. G. Macklin, Peterboro, Ont., Chief Engineer.

Great Northwest Central.—Hamiota, Man., to Battleford, N. W. T.; projected. Arthur Codd, Ottawa, Ont., Secretary.

Lake Erie & Detroit River.—End of track at Merlin, east to Blenheim, 13 miles, graded; surveyed 10 miles further to Ridgetown. Joseph DeGurse, Chief Engineer, Windsor, Ont.

Ottawa, Arnprior & Parry Sound.—Ottawa west to Arnprior, 35 miles; most of the grading completed; projected west toward Parry Sound, 170 miles; the line is an extension of the Canada Atlantic. George A. Mountain, Ottawa, Ont., Chief Engineer.

Ottawa & Gatineau Valley.—Seventeen miles; end of track north to Kazabazua, north to Le Desert, 17 miles, being built by day labor. W. D. Harris, Chief Engineer, Ottawa.

Parry Sound Colonization.—Bear Lake west to Eaginstown, 10 miles, graded; Eaginstown west 20 miles, under contract, being graded. S. R. Paulin, Emsdale, Ont., Chief Engineer.

Wiarton Southern.—Chatsworth to Wiarton; preliminary surveys made. Wm. Stuart, Toronto, Ont.

Northwest Territories.

Canada Western Central.—Northern end of Vancouver to eastern boundary line of British Columbia.; preliminary surveys have been begun, and contracts may be let in the spring. R. P. Rithet, Victoria, B. C.

Canadian Pacific.—Pasqua south to International Boundary, 161 miles, under construction; nearly all graded, and track will be laid in 1893. W. Whyte, Winnipeg, Man., General Superintendent Western Division; P. Alex. Peterson, Chief Engineer, Montreal.

Nelson & Fort Sheppard.—International Boundary Line near Northport, Wash., connecting there with Spokane & Northern, which will control the new line, thence north to Nelson and the Kootenai mining region; surveys practically completed and contracts to be let in the spring. D. C. Corbin is President and E. J. Roberts, Chief Engineer, both of Spokane, Wash.

MEXICO.

Jalisco Pacific.—Colima, a port on the Pacific Ocean, northeast to Guadalajara, 166 miles, under survey; the actual construction work probably will not be begun for some time. H. H. Filley, Kansas City and City of Mexico, Chief Engineer.

Mexican International.—Monclova, west toward Sierra Mojado, 160 miles, under construction west of Monclova and all surveyed. L. M. Johnson, Eagle Pass, Tex., General Manager.

Mexican Interoceanic.—From Chietla, about 12 miles. Moylan Bros., Puebla, Mex., Contractors; H. A. Vaughn, Puebla, Superintendent.

Mexican Northwestern Pacific.—Mexican boundary line south of Deming, N. M., to Curvilatos, 90 miles, and Chihuahua to Guerero, 100 miles, under contract.

Mexican Southern.—Present terminus at Oaxaca to Tehuantepec, 175 miles, projected. W. Morcom, Puebla, Mex., General Manager.

Mexico, Cuernavaca & Pacific.—Some grading done near city of Mexico, and about 15 miles of track laid, locating survey being made between Contreros and Cuernavaca. J. L. Butman, City of Mexico, Chief Engineer.

Michoacan & Pacific.—Ocampo to Cuernavaca, 190 miles, company expected to commence grading last month. L. R. Gordon, Maravatio, Mex., General Superintendent.

TECHNICAL.

Manufacturing and Business.

In order to make all parts of their steam pressure regulators interchangeable, after the fashion of firearms, sewing machines, etc., the Foster Engineering Co., of Newark, N. J., has just entered a large order with the Gisholt Machine Co., of Madison, Wis., for a line of their turret lathes, with all accompanying special tools, to build the different sizes and styles of their regulators and pump governors.

George M. Kenyon has purchased the interests of his partner, R. C. Ramsay, of St. Paul, in the firm of Ramsay & Kenyon, Mr. Ramsay retiring to enter another business. Mr. Kenyon will continue to act as northwestern agent for the Tudor Iron Works, the Belleville Steel Co. and the American Nut Lock Co., of St. Louis, Mo., the Ball & Wood Engine of New York, and the National Machinery Co., of Tiffin, O. His office is at 109 Endicott avenue, St. Paul.

The Morrison Convertible Car Seat Co., of Chicago, capital stock $500,000, has been chartered in Illinois by J. D. Morrison, George W. Amos and H. A. Holzbaurer.

Mr. Merle Middleton has been made Manager of the western agency of the Safety Car Heating & Lighting Co., with headquarters at Chicago.

Iron and Steel.

The Denver & Rio Grande Co. has just placed an order at the Bessemer Steel Works, at Pueblo, Col., for 5,000 tons of 65-lb. rails.

New Stations and Shops.

The Norfolk & Western Railroad will begin the erection of station buildings at Ceredo, Shoals, Ferguson, Bredon and Matewan on the Ohio extension in West Virginia as soon as the weather opens.

An Emery Wheel Combination.

The Columbian Emery Wheel Co., with $6,000,000 capital, was incorporated under the laws of the State of New Jersey, Jan. 12, 1893. The following were elected directors: Frederick S. Dickson, Philadelphia, Pa.; F. H. Pietsch, Chicago, Ill.; L. Best, New York, N. Y.; C. Ross Grubb, Camden, N. J.; Clarence Tebbets, Waltham, Mass.; F. R. Preston, Detroit, Mich.; Harlan Page, Philadelphia, Pa.; George Maitland, Detroit, Mich.; George W. Jackman, Bridgeport, Conn. The following officers were elected: Frederick S. Dickson, President; F. H. Pietsch, Vice-President; L. Best, Secretary; F. R. Preston, Treasurer. The purpose of the company is to purchase all of the emery mills in the country and all of the emery and corundum wheel factories. The headquarters of the company will be in New York.

Niagara Tunnel.

It is expected that contracts will be let the last of the month for the electrical machinery for the new Niagara power tunnel.

Air Brakes.

It is probably true that the railroads of the United States cannot now equip their rolling stock any faster than the Westinghouse Air Brake Co. can supply the brakes from their new Wilmerding shops. They announce that they can at an hour's notice fill orders for 1,000 sets of freight brakes, and have an annual air brake capacity for 250,000 freight cars, 6,000 passenger cars and 10,000 locomotives, besides furnishing repairs for the 350,000 freight and passenger cars and 26,000 locomotives already equipped.

New York and Brooklyn Bridge.

Proposals will be received by the Trustees of the New York & Brooklyn Bridge, at 179 Washington street, Brooklyn, N. Y., up to 12 o'clock noon, Saturday, Jan. 28, 1893, for supplying the materials and performing the work required to construct the new Brooklyn station and its approach. The undertaking includes structural and architectural steel and iron work, masonry, carpentry, plumbing and painting. Drawings of the station may be seen and further requisite information had upon application at the Engineer's office, 179 Washington street, Brooklyn. The contractor will be required to give a bond for a sum not less than 25 per cent. of the total amount estimated to be paid on the contract, also to guarantee the service of certain parts or items. The Trustees reserve the right to divide the contract, to contract for the whole or part of it, and to reject any or all of the proposals offered.

The Trustees have issued elaborate and minute specifications for the guidance of contractors. The new station will be for the accommodation primarily of the bridge traffic, but provision is made also for passengers arriving and departing by the two elevated railroads and several surface railroads which reach that end of the bridge. The main station is rectangular, 357 ft. 6 in. long, 89 ft. 6 in. wide, with two wings each 25 ft. × 56 ft. 8 in. The structure will have three floors. The first floor will contain toilet rooms, etc., and ticket booths; the second floor will contain passenger platforms and tracks for the bridge railroad; and on the third floor will be the platforms and tracks of the Brooklyn Elevated Railroad. There are also ticket booths on the second and third floors, and there are two passenger elevators to connect the platforms on the third floor with the street level.

The structure will have a metal frame and roof tresses, and the outer walls will be of brick and of metal panels. The inner walls and partitions will be of brick or wood and glass and the floors of brick or terra-cotta arches be-

tween the girders and beams, covered with concrete or wood. As far as may be practicable the framework of the existing elevated structures on the site of the station will be incorporated in the permanent structure of the station itself. Traffic, of course, must not be interrupted during the erection of the station either on the bridge or on the elevated railroads. The Trustees therefore reserve the right to direct the manner and order in which the several stages of the work shall be done.

National Road-Builders' Convention.

A convention of delegates from all the States of the Union of the National League for Promoting Good Roads, opened Tuesday, at Chamberlin's Hotel, Washington.

Serve's Ribbed Steel Boiler Tubes.

Mr. C. W. Whitney, of New York, has just taken an order for 1,840 Serve's ribbed steel tubes 3½ in. in diameter × 10 ft. 3½ in. long for the new Fall River steamer, which is to surpass in size, speed and elegance of her appointments any steamer of her class hitherto built in this or any other country. The engines and boilers are being built by the W. & A. Fletcher Co., of Hoboken, N. J., and the order for the Serve tubes comes from this firm. This steamer is to have 10 boilers of the Scotch marine type 14 ft. in diameter and 14½ ft. long, each boiler to be fitted with 184 of the above tubes. With plain tubes the consumption of fuel by this steamer was estimated at 160 tons per round trip between New York and Fall River, and it is estimated that the saving in fuel or increased steaming capacity by the use of ribbed tubes will be at least 10 per cent. At the present cost of anthracite coal in New York, viz., $4.30 per ton in the bunkers, ribbed tubes pay for themselves outright in two years' service.

Electric Power on the New York Canals.

Governor Flower is reported as being very much in favor of an electrical installation to furnish power for operating the boats on the canals of the State of New York. He has an estimate that the cost of the plant, including power stations and trolley wires, would not be much over a million dollars. This includes 13 or 14 power stations spaced about 30 miles apart. He estimates further that power could be furnished to the boats for about 60 cents a day, and that it would cost from $150 to $200 to fit up each boat with the necessary machinery. He thinks that a good deal of the present cost of repairs to the canals, a large proportion of which are on the towpath, would be saved, and that the state would gain directly by the substitution of electricity for mules.

The "Brooklyn" and the "Iowa."

Contracts for building the battleship "Iowa" and the armored cruiser "Brooklyn," bids for which were opened at the Navy Department on Dec. 15, were awarded Jan. 11. The bid of the Cramps was accepted. Their bids were: For the "Iowa," $3,010,000, and the "Brooklyn" $2,986,000. The other companies competing and amounts bid by them were: The Ship & Dry Dock Company, of Newport News, $3,233,000 and $3,147,000; Union Iron Works, of San Francisco, $3,150,000 and $3,050,000; Bath Iron Works, $3,185,000 and $3,165,000. The Cramps proposed to construct both vessels with quadruple instead of triple expansion engines, but upon recommendation of Chief Engineer Melville the idea was rejected by Secretary Tracy, who directs that plans for the engines designed by the department be followed by the contractors.

Pintsch Gas Plants.

About the only objection to the use of the Pintsch system for car lighting, the difficulty of recharging, is fast disappearing. Works for making and compressing are now so numerous at junction points and terminals that Pintsch lighted cars can run almost everywhere in the country. The following is a list of the works now in operation: Boston, Mass.; Jersey City, N. J. (2); Weehawken, N. J.; Hoboken, N. J. (2); St. Louis, Mo.; Kansas City, Mo.; Portland, Or.; Stonington, Conn.; Cincinnati, O.; Marion, O.; Toledo, O.; Council Bluffs, Ia.; Denver, Col.; Chattanooga; Tenn.; New York City, N. Y.; Syracuse, N, Y.; Buffalo, N. Y.; Chicago, Ill.; Minneapolis, Minn.; Ogden, Utah; Savannah, Ga.; Atlanta, Ga. Preparations are now making to put up works at Washington, Baltimore, Indianapolis, Memphis, New Orleans, Louisville, Columbus, Cleveland and Oakland.

Refining Steel.

The Pennsylvania Steel Refining Co. has secured the exclusive right to use in all the Middle states, where three-quarters of all the steel in the United States is made, the patents on a new process of refining steel. The process takes Bessemer or open-hearth low grade steel and converts it into high grade tool steel suitable for making chisels, shears, drill, lathe, planer and all kinds of machinery tools. It also makes a very superior article for cutlery purposes, being easily worked, taking a strong temper, and holding its edge when other steel fails. A complete physical change takes place in the steel under this refining process. It is claimed that the molecular changes are permanent, and the qualities of tensile strength and elastic limit are possessed to a greater degree than by any now manufactured. The company does not claim to refine iron or convert iron into steel, but confines its work to the refining of Bessemer or open-hearth steel, and this is done as fast as the billets can be heated. The tools made from this steel have been and are being worked in competition with tools made from the highest grades of steel. Considering the price at which it can be manufactured, it must of necessity become a very important commercial competitor in the market, as against the higher priced tool steel, both American and imported, now in general use. This steel being of such a high grade, it must be worked at a low heat and tempered at dark cherry.

THE SCRAP HEAP.

Notes.

The machinists in the shop of the Atlantic & Pacific at Albuquerque, N. Mex., struck for higher pay on Jan. 13.

The Wabash has refused the request of its telegraph operators for an advance in pay, though promising to investigate certain individual cases.

A press dispatch states that the Atchison, Topeka & Santa Fe has notified its employés to withdraw from the "Brotherhood of Station Men." The dispatch states that they complied, but how many men this refers to does not appear.

The yard brakemen of the Lake Erie & Western, at Muncie, Ind., struck last week, and it is said that every iron and steel plant in the city is now closed, with more than 1,000 men out of work. The road brought on new men, but the police protection was inadequate.

The Central of Georgia has put on a train to run from Savannah to Macon, 191 miles, in four hours, and at about the same speed for the rest of the distance to Atlanta. It would appear from the newspaper reports, however, that the train has not maintained this schedule with great success.

A Baltimore dispatch states that the Baltimore & Ohio road, which recently made the minimum salary of the telegraph operators $45 a month, has abolished the telegraph offices at a number of small stations, thus permitting the employment of an agent at a smaller salary. The dispatch adds that the committee of the Brotherhood were warned beforehand that this would probably be the outcome of the new regulations.

The Baltimore *American* states that the Baltimore & Ohio is equipping some of its stations with the individual calling apparatus of the Electric Secret Service Company. This apparatus, which was described in the *Railroad Gazette* of Aug. 28, 1891, enables a dispatcher or chief operator to call a way station operator, even if he be asleep or engaged several rods from the office, by sending dots and dashes, which close a local circuit that rings a bell continuously until the operator responds.

World's Fair Notes.

The following terminal charge will be made on equipment on its own wheels: Empty cars of all descriptions, $5 per car; locomotives with tenders, $10 per locomotive. These terminal charges will be made in each direction.

Freight charges on exhibits, including the Exposition terminal charge, must be prepaid at point of origin, as exhibits must be delivered at the Exposition clear of all charges incident to their transportation. No transportation or other charges will be advanced by the Exposition management.

The concession for the guide to the Exposition has been awarded to the Columbian Guide Publishing Company. The company pays the Exposition company 20 per cent. of the first $25,000 of all income, after which the percentage received by the Exposition company increases by stages until it amounts to 60 per cent. on all sales after the receipts reach $500,000.

The recent cold weather has been the cause of considerable inconvenience in all of the World's Fair buildings, and in some cases it has been necessary to suspend work of all kinds until the weather moderates. One of the results of the extreme cold is that men are kept busy cutting a channel in the center of the lagoons to prevent damage to the interior docking as far as possible on account of the expansion of the ice. Recently the ice has formed again almost as soon as it has been cut.

A large number of boats and launches are now being built at various points for use at the World's Fair. Fifty electric launches for the lagoons are being constructed at Detroit and Racine, and larger steamers, which might be called steam yachts, are being built in Chicago. There are 12 of these which are to be 50 ft. long, that being the limit set by the Exposition officials. These boats are to be fitted with triple expansion engines and are to have a speed of about twelve knots.

On all exhibits (except equipment on its own wheels), whether in carloads or less than carloads, the World's Columbian Exposition will make a charge of six cents per 100 lbs., with a minimum charge of 50 cents for any single shipment, for placing same on or adjacent to the space allotted. The terminal charge of six cents per 100 lbs. when shipments are made at carload rates will, when the actual weight is less, be on the minimum carload weight adopted by the initial line, and will be accepted as correct. An extra charge will be made for handling single exhibits weighing over 30,000 lbs. Special arrangements for handling these must be made in advance with W. H. Holcomb, General Manager Transportation, World's Columbian Exposition, Chicago.

It is estimated that the receipts of the Exposition company from the various franchises and concessions will amount to about $3,500,000. It is well known, of course, that a large percentage of the gross receipts of all the sub-companies doing business in the Fair Grounds goes to the Exposition company. From the restaurants the company receives 25 per cent. of the gross receipts, which percentage it is thought will amount to $2,500,000. The fare on the electric elevated road will be 10 cents, of which the Exposition company is to receive one-fourth. The Barre Sliding Railroad will turn over the greater part of its gross receipts to the Exposition company. The above are simply a few of the sources of income of the Exposition company in addition to the admission fees. Other sources are the World's Fair Steamship Company, the boat franchise for the lagoons, the sanitary concession, the wheel chair concession and the World's Fair Tower. To these must be added all of the foreign villages and other exhibitions on the Midway Plaisance, and the minor concessions of soda water, peanuts, etc., which aggregate about $100,000.

Another Elevated Railroad for Brooklyn.

Austin Corbin, President of the Long Island Railroad Company, has petitioned the Brooklyn Board of Aldermen for permission to construct an elevated road, and hopes to have the work done very soon if his request is granted. The proposed railroad is to be on the routes laid down by the Chapin Rapid Transit Commission in 1889. One route is from the ferry house at the foot of Atlantic avenue, along that thoroughfare to the city line in the Twenty-sixth ward.

Monument to Gauss and Weber.

Gauss and Weber, the eminent German scientists, are to be honored by the erection of a monument at Göttingen, Germany. This, at least, is the intention of a number of men prominent in German scientific circles, and it is proposed to solicit contributions and suggestions for the memorial from scientists all over the world.

The Engineers' Club.

The annual meeting of that flourishing and popular institution, the Engineers' Club of New York, was held last Tuesday. The following officers were elected: President, J. F. Halloway; Vice-Presidents, John Stanton and John Fritz; Treasurer, A. C. Rand; Secretary, David Williams; Board of Managers, to serve till 1897, J. F. Halloway, John Stanton, John Thomson, J. E. Denton, W. H. Wiley; to serve till 1895, Foster Crowell; to serve till 1894, C. M. Wales. These are, of course, in addition to the membersof the board now serving, whose terms expire at various intervals. The total membership is 601, and the cash balance on hand is $6,805 with no debts.

New York Hours-of-Labor Law Unconstitutional.

By a decision of the Court of Appeals, Chapter 711, laws of 1892, providing for a limit of the hours of service, is declared to be unconstitutional. The decision was on the appeal in the case of the People vs. James H. Phyfe, which came up on a demurrer to an indictment found by the grand jury in Westchester County, charging Phyfe with violation of the law in permitting George H. Bedell, a trainman employed by the New York Central at $2.10 per day, to work 14½ hours continuously. The defendant demurred, arguing that the act authorizes such an interference with private business and property, and the freedom of contracts as is forbidden by Section 6, Article 1, of the State Constitution. The order and judgment of conviction is reversed, the indictment is dismissed and the prisoner discharged.

The Watkin Tower and the Channel Tunnel.

English journals say that "As the contract for the metal has now been placed, it may be expected that work on the great tower at Wembley Park, London, will shortly be proceeded with. The erection, which is to eclipse anything of the kind that has ever been attempted, is to be entirely constructed of steel, which is to be furnished by the Stockton Malleable Iron Co. It will be 1,150 ft. high above the base, which will rise 162 ft. above the level of the ground, and it will therefore exceed by some 150 ft. the height of M. Eiffel's celebrated Parisian structure. Messrs. Heenan & Froude, of Manchester, are building the tower.

"A conference of the supporters of the Channel Tunnel Bill, English and French, will be held in London next month. The bill is among the measures carried over from the late Parliament, and will stand at the opening of the coming session for second reading. At a recent meeting of the Channel Tunnel Co. Sir Edward Watkin said that the existence of coal under the company's lands between Folkestone and Dover was fully demonstrated, and the directors were forming a separate association for working the coal. They would take care that the claims of the tunnel shareholders should be duly considered. He condemned in strong terms the stoppage of the tunnel works by Mr. Chamberlain when President of the Board of Trade, and said another bill would shortly be brought before Parliament, when he hoped it would be successful."

The Geological Map of New York.

At the Lake Champlain meeting of the American Institute of Mining Engineers, held last October, Mr. James Hall, State Geologist of New York, made a brief statement of the situation concerning a geological map of the state. The showing is certainly discreditable to the great state, and rather discouraging to those who take much interest in good government. It is a matter of fact that no geological map of the state at all complete or authoritative exists, and for 25 years Mr. Hall has been laboring to have one made. In 1883 he combined on a small map of the state such information as had been collected, but the special appropriation for engraving and publishing the map was vetoed by the Governor. In 1884 he secured through Major Powell the aid of the cartographer of the United States Geological Survey, Mr. McGee, and together they constructed a base map, and laid down the geology of the state so far as accurately or approximately determined. An appropriation was made by the state legislature for engraving this map, but that again was vetoed. The United States Geological Survey has spent about $7,000 on this base map of New York State, but that state has not so far spent a cent in co-operation.

Heated Freight Cars in Germany.

Since November, 1892, provisions have have been in force for having heated freight cars in some of the freight and mixed trains on the lines of the Erfurt district, in Germany. These heated cars are to be kept in use until March 1, without extra charge to shippers, and are designed for the transportation of freight liable to suffer from frost, such as flowers, seeds, fruits, drugs and chemicals, eggs, confectionery, potatoes, vegetables and other agricultural products, etc. The maximum weight of each piece of freight offered for shipment in these cars is limited to 75 kg., or about 165 lbs.

A Hundred Persons Killed in Train Accidents.

Cable dispatches this week report the death of about 50 soldiers by the burning of a railroad train in Russia, and the killing of 50 by an explosion, caused apparently by a slight collision, on the Congo Railroad. The Russian accident was between Slatusk and Samara, Jan. 17. A train filled with recruits was running from Slatusk to Samara, when flames burst from the foremost car. The train was going at full speed, and the fire swept backward, and in a few minutes all the cars were blazing. The engineer for some reason did not stop. Many of the recruits leaped from the windows and doors. Some of them landed uninjured in the heavy snowbanks, while others who struck on the cleared track were killed. Those who were unable to get out of

the cars were burned to death, for the train was entirely consumed. Some of the men were terribly burned before they jumped. When the confusion had somewhat subsided the officer in charge of the recruits, who saved himself by jumping, called the roll of his men. It was found that 49 of them were dead and 20 terribly burned or otherwise injured. It is supposed that hilarious soldiers upset the stove.

The African accident is described as follows in a dispatch from St. Paul de Loanda, Jan. 15:

"A train crowded with Europeans and natives was halted near Matadi and the engine was detached to take on a car loaded with 54 boxes of dynamite and 82 casks of gunpowder. The engine moved down grade with great speed and ran into the wagon, exploding the dynamite. Fifty persons were killed, including M. Lequeue, head of the Société Anonyme Belge."

The Chicago Street Railroads.

From the published annual report of the North Chicago Street Railroad, it appears that the road carried 54,419,457 passengers during the year 1892, with a total car mileage of 8,547,791. The net profits of the year were $752,546 or at the rate of 15 per cent. on the capital stock. Operating expenses were 52.9 per cent. of the gross earnings. Car repairs cost $44,401, or at the rate of about .52 cents per car-mile. The expense for rope was $69,199. The operating expenses were $1,334,052, and the gross receipts from all sources $2,611,259. The average receipts per car-mile were 29.499 cents. The average expense per car-mile on the cable road was 13.065 cents, and for the horse lines 19 26 cents.

From the report of the West Chicago Street Railroad it appears that the number of passengers carried during the year was 94,518.474, and the number of car-miles was 15,582,141. The gross earnings were $4,620,225, and the operating expenses $2,687,310. The fixed charges are given as $859,075, leaving the net earnings applicable to dividends as $1,370,837. This is about 10.3 per cent. on the capital stock. Of the operating expenses, maintenance of way cost $167,332, motive power $841,779 and maintaining cars $149,678. Of the total car-mileage about 9,000,000 was made by horse cars and about 6,500,000 by cable cars. The receipts per mile for the horse cars were 29.19 cents, and for cable cars 30.29 cents, and the expenses per car-mile were respectively 19.66 and 13.88 cents. Operation of the power stations cost $94,716, or an average of 17.76 cents per mile run by the cable, and the total cost per mile run by the cable was 23.63 cents. The proportion of operating expenses to gross earnings was 58.16 per cent.

Foreclosure Sales and Receiverships in 1892.

During 1892 there were sold under forclosure 28 railroads, having an aggregate mileage of 1,922 miles and an apparent capitalization—bonds and stocks—of $95,898,000. The number of roads is larger than in the previous year, but the mileage and capitalization show a large decrease. The longest roads are the Oregon Pacific, East Line & Red River (N. G.), Florida Southern, Oregon & Washington Territory, Charleston, Cincinnati & Chicago; St. Louis, Alton & Springfield; Houston E. & W. Texas (N. G.), Macon & Atlantic. The record of insolvencies in the past year shows that no less than 36 companies, having 10,508 miles of road and representing the prodigious capitalization of nearly $358,000,000, have defaulted and been placed in the hands of receivers. The principal companies are the Atlanta & Florida, Chattanooga Southern, Charleston, Sumter & Northern, Central of Georgia, Richmond & Danville, Valley (Ohio), East Tennessee, Virginia & Georgia, Louisville Southern, Mobile & Birmingham, Memphis & Charleston, Jacksonville, Tampa & Key West, Macon & Northern, Mobile & Girard, Savannah, Americus & Montgomery. —*Railway Age.*

Elimination of Grade Crossings on the Central of New Jersey.

It is announced that the Directors of the Central of New Jersey have decided to abolish all grade crossings of highways on that portion of the road which constitutes a part of the main line from New York to Philadelphia; that is, between Jersey City and Bound Brook, 31 miles. The total estimated cost of the contemplated improvement is $800,000. This apparently does not include any of the expense at the complicated crossing near the station in Elizabeth, where a costly and radical change is now being made. The places where bridges will have to be built are Elizabeth (eight crossings), El Mora, Roselle, Cranford, Westfield and Centreville.

The additional tracks under construction will be completed so that by spring there will be four main tracks from Jersey City to Bound Brook, except across Newark Bay. This improvement for the benefit of suburban passenger service will be supplemented by the building of fences at all stations to prevent persons crossing tracks except under proper regulations, and the equipment of the passenger cars with platform gates.

LOCOMOTIVE BUILDING.

The Central of New Jersey is in the market for about 30 engines.

The Wisconsin Central has contracted with the Brooks Locomotive Works for building 13 consolidation and eight-wheel passenger engines.

The Baldwin Locomotive Works has been awarded the contract for building 10 ten-wheel engines for the Monterey & Mexican Gulf road.

The Metropolitan West Side Elevated Railroad of Chicago has let contracts for 20 compound locomotives to the Baldwin Locomotive Works.

The Cincinnati, Hamilton & Dayton has awarded a contract to the Pittsburgh Locomotive Works for building seven consolidation engines.

The Pennsylvania has, it is stated, placed an order at the Juniata shops for 32 class "P" locomotives. It is stated that these shops have orders for 58 other locomotives.

The Chicago & Northern Pacific has given an order to the Brooks Locomotive Works to build six ten-wheel engines, four six-wheel switchers and one eight-wheel passenger locomotive.

The Rhode Island Locomotive Works has received an order from the New York, New Haven & Hartford to build 31 engines, including six-wheel switching, eight-wheel passenger and mogul locomotives.

The Rhode Island Locomotive Works is building 3 two-cylinder compound passenger locomotives for the Chicago, Milwaukee & St. Paul. These engines are to have six driving wheels, a trailing truck and a four-wheel leading truck. The approximate weights are 32,000 lbs on the leading truck, 80.000 lbs. on the driving wheels and 18,000 lbs. on the trailing truck, giving a total weight of about 137,000 lbs. The driving wheels are 6 ft. 6 in. in diameter. The cylinders are 19 and 31 in. in diameter by 26-in. stroke. These engines will be used for fast passenger service between Chicago and Milwaukee.

CAR BUILDING.

The Ensign Manufacturing Co. has received an order from the Canda Cattle Co. for 1,000 cattle cars.

The Great Northern has ordered from the Wells-French Car Co., 408 Rodger Ballast cars to be used in handling ore.

The Metropolitan West Side Elevated railroad of Chicago has let contracts for 100 passenger cars to the Gilbert Car Co., of Troy, N. Y.

The Great Northern has ordered from the Haskell & Barker Car Co., of Michigan City, Ind., 750 furniture and 250 platform cars.

The Minneapolis, St. Paul & Sault Ste. Marie has ordered a second equipment of 26 Rodger Ballast cars from the Wells-French Car Co., of Chicago.

BRIDGE BUILDING.

Cleveland, O.—A bill asking that the County Commissioners be authorized to erect a new bridge to take the place of the present Brighton-Brooklyn viaduct at Cleveland is likely to be introduced in the state legislature during the present session. For some time the present structure has been considered unsafe. The new structure, if built, will cost about $125,000.

Glenville, W. Va.—The superstructure for the new steel bridge over the Little Kanawha River at Glenville, Gilmer County, W. Va., arrived at that place last Friday, and will be erected as soon as the ice in the river moves out.

Houston, Tex.—The King Bridge Co. has the contract for an iron bridge over Bray's Bayou, to be built by Harris County.

Memphis, Tenn.—The following bids for building the superstructure of the La Rose street bridge: Penn Bridge Co., plan A, $3,335; plan B, $3,500; King Iron Bridge & Mfg. Co., $3,800: Milwaukee Bridge & Iron Works, $4,000; George H. Crofts & Co., $2,890; Louisville Bridge & Iron Co., plan A, $3,210; plan B, $2,850; Massillon Bridge Co., $3,000: Columbus Bridge Co., $3,950: American Bridge & Iron Co., $3,700; Edwin Thatcher, $2,900; Detroit Bridge & Iron Works, $3,450; Phœnix Bridge Co., $3,365; Youngstown Bridge Co., $3,215.

Minneapolis, Minn.—The contract for the masonry piers and abutments of the Great Northern bridge across the East Channel of the Mississippi has been awarded to Ring & Tobin, of Minneapolis. The bridge will be in three spans, aggregating 300 ft., and the superstructure will be built by the Edge Moore Bridge Works.

St. George, W. Va.—The County Court of Tucker County, W. Va., last week appointed William M. Clayton and C. W. Miner commissioners to receive, until April 3, bids for the erection of a steel bridge over Cheat River at St. George, in that county, in accordance with plans adopted by the courts some months ago.

South Bound Railroad.—Four steel bridges will be built on the extension of this road to Jacksonville, Fla., recently placed under contract. The longest bridge will be 686 ft., with five spans and a 134-ft. draw. The other bridges will be 420 ft. long, three spans with a 144 ft. draw; one of 410 ft., three spans with a 134-ft. draw and one of 342 ft., with two spans and a 114-ft. draw. These bridges are respectively across the following rivers: The Satilla, St. Mary's, Altamaha and Ogeechee.

Spokane, Wash.—The bids for the construction of the new Cedar street bridge were opened last week by the County Commissioners. The San Francisco Bridge Co. submitted three different plans and bids—one at $37,000, $58,000, and the third for $105,000. J. L. Bayley submitted bids varying from $45,000 to $67,000, and accompanying plans. Andrews Bros., representing the Toledo Bridge Co., submitted six bids as follows: $50,000, $52,000, 59,000, $89,000, $92,000, and $95,000. The Commissioners have been enjoined from awarding the contracts.

Virginia, Ill.—The Indiana Bridge Co, is building an iron and steel wagon bridge across the Sangamon River at Chandlerville, joining Cass and Mason counties, costing $3,500.

Washington.—The President has approved the following bills: Authorizing the construction of a bridge across the Columbia River, State of Washington. Authorizing the Natchitoches Cane River Bridge Co., to construct a bridge over the Cane River, Louisiana. Authorizing a bridge across the Red River, Louisiana, by the Rapid Bridge Co., Limited.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Pacific, semi-annual, 1 per cent., Feb. 1.
Flint & Pere Marquette, semi-annual, 2 per cent. on the preferred stock, payable Feb. 15.
Huntingdon & Broad Top, semi-annual, 3½ per cent. on the preferred stock, and 2½ per cent. on the common stock, payable Jan. 24.
Lake Erie & Western, quarterly, 1¼ per cent., on the preferred stock, payable Feb. 15.
Long Island, quarterly, 1¼ per cent., payable Feb. 1.
Louisville & Nashville, semi-annual, 2 per cent., payable Feb. 3.
Wheeling & Lake Erie, quarterly, 1 per cent., on the preferred stock, payable Feb. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Fort Wayne & Jackson, annual, Jackson, Mich., Jan. 25.
Middletown & Hummelstown, annual, Philadelphia, Pa., Jan. 24.
New York, New Haven & Hartford, adjourned, New Haven, Conn., Jan. 31, to act upon the lease of the Providence & Worcester.
Texas, Sabine Valley & Northwestern, special, Longview, Tex., Feb. 13, to increase the capital stock.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* holds regular meetings at the United States Hotel, Beach street, Boston, Mass., on the second Wednesday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at 7:30 p. m., at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

The *Engineers' and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

Central Railway Club.

The annual meeting of this club will be held at the Hotel Iroquois, Buffalo, Wednesday, Jan. 25, at 2 p. m. Subject for discussion: "What practice should be adopted in order to collect bills for a portion of the defects noticed on M. C. B. cards that render car unsafe, when card includes other defects which are not necessary to be repaired."

Civil Engineers' Club of Cleveland.

At the meeting of the Civil Engineers' Club of Cleveland, held Jan. 10, Dr. John W. Langley, of Case School of Applied Science, read a paper on "Some Physical Properties of Steel as Related by Its Structure and Composition." He said steel is defined as a solution of several elements in iron; the principal elements being carbon, silicon, phosphorus and manganese. Limitations of the scope of the definition to "high steel" are given. Then follows an explanation of the terms combination and solution and reasons given for considering steel to represent the latter rather than the former. The influences of the above four elements on the fusibility, the hardness, the toughness, and the disposition to crack are given by a set of curves showing the relation between the property in question and the quantity of the added elements. The subject of the hardening and annealing of steel is then discussed and the phenomenon of recaliscence illustrated by graphical construction.

Civil Engineers' Society of St. Paul.

The tenth annual meeting of the Civil Engineers' Society of St. Paul was held at the Society Library, Jan. 9, 13 members and three visitors present. President Woodman in the chair.

Resolutions were passed acknowledging courtesies received by members of the Society from the engineers of West Superior and Duluth, and officials of the West Superior Steel Works and the Duluth & Iron Range Railroad on their trip to the head of the lake and the iron mines at Tower and Ely in November last. The annual election resulted as follows: President, Geo. L. Wilson; Vice-President, J. D. Estabrook; Secretary, C. L. Annan; Treasurer, A. O. Powell; Librarian, A. Wünster; Representative on the Board of Managers of the Association of Engineering Societies, C. J. A. Morris. The President elect made the following appointments for the ensuing year: Examining Board, C. F. Loweth, A. O. Powell and E. E. Woodman; Auditor of Accounts of 1892, W. C. Merryman.

Mr. Joseph S Sewall, M. Am. Soc. C. E., designer and engineer in charge of construction of the bridge over the Mississippi River, connecting Marshall avenue in St. Paul with Lake street in Minneapolis, informally presented some interesting data concerning that structure. The bridge consists of two principal iron arch spans of 456 ft. each, and its total length is 1,273 ft. A 20-ft. roadway is laid on 7 in. × 16 in. wooden stringers and is designed to admit the passage of a 15-ton road roller. There is a 5-ft. sidewalk on either side. The appropriation was limited to $150,000, and was to cover all preliminaries. The cost of the substructure (abutments resting on sand, rock and pier, on gravel) was $32,360; superstructure, $109,100. Portland cement was used in freezing weather only. Work was begun in October, 1887, and finished in May, 1889, considerable delays being caused by non-arrival of material.

Thanks being voted to Mr. Sewall, Mr. W. H. Wood was called upon. He has lately returned from a five years sojourn, in Southern Mexico. In his remarks he touched upon the novel methods of promoting and carrying on engineering enterprises in the far south, as exemplified by the construction of the Mexican Southern Railway and the draining of the City of Mexico. Twenty per cent. is estimated as the cost of engineering on railroad work.

Engineers' Club of Philadelphia.

The fifteenth annual meeting of the club will be held on Saturday, Jan. 21, 1893, at 8 o'clock p. m. A full attendance is desired, in order to determine the future policy of the club. Mr. James Christie, the retiring President, will deliver the annual address. The annual report of the Board of Directors and that of the Treasurer will be read. The tellers will announce the results of the election for officers. The matter of the club's indorsement of the Act Relative to a Forestry Commission, which was presented at the meeting of Jan. 7, 1893, will come up for action. Lunch, followed by social reunion, will be served after the meeting.

Engineers' Club of St. Louis.

The club met at 8 P. M. January 4, 1893, President Moore in the chair; seventeen members and three visitors present. Communications from the Civil Engineers' Club of Cleveland, and the Wisconsin Polytechnic Society were read, in which they announced that they had adopted the by-law in relation to the exchange of members.

The subject set for the evening, "The Recent Survey of St. Louis: Its Methods and Results," was then announced as open for discussion. The uses of the survey in regard to laying out city lots were discussed by Messrs. Johnson, Bouton, Colby and Hermann. Mr. Ferguson spoke of the desirability of having a survey advance ahead of the growth of the city. Messrs. Moore, Bouton and Hermann spoke of the difficulty of relocating the old points. Mr. Ferguson read a discussion on the subject. The difficulties in handling the instruments and obtaining accurate results were gone over and the troubles pointed out. Sketches were recommended as an aid in working up the notes.

Professor Johnson read a paper in which the question of errors in precise leveling was gone over. Mr. Ockerson described the methods and results obtained on the river work. Mr. Jolley described some of his difficulties with the stadia rod and level.

Mr. Ockerson presented to the club a copy of his book, "The Mississippi River from St. Louis to the Sea."

Illinois Society of Engineers:

The eighth annual meeting of the Illinois Society of Engineers and Surveyors will convene in the Supervisors' Room of the Court House at Springfield, Wednesday evening, Jan. 25, at 7:30 o'clock. The meeting gives promise of being one of the best ever held by the society. The following papers are to be presented: President's Address, S. S. Greeley, Chicago; Notes on Hydro-Geology of Illinois in Relation to Water Supply, D. W. Mead, Rockford; the Best Practical Methods of Constructing Hard Roads, J. E. Miller, Monmouth; Brick Pavements, T. S. McClanahan, Monmouth; Surveying a Parallel of Latitude, Prof. I. O. Baker, Champaign; Rules for House Drainage, R. E. Orr, Chicago; "Mathematical Exactness" as found in our Tables of Sines and Cosines, D. L. Brancher, Lincoln; the Prevention of Cholera in Municipalities, S. A. Bullard, Springfield; Special Assessment Law of Illinois, Its Just and Its Unjust Features. Papers are expected from Jas. M. Healey, Champaign; E. J. Chamberlain, Pittsfield, and several others. Many topics will be presented for general discussion in an informal manner. The roll will be called, and each member present will be expected to give his opinions, beliefs and experiences in regard to each.

The Northwest Railroad Club.

The Northwest Railroad Club held its annual meeting for the election of officers at St. Paul Jan. 10. The election resulted as follows: President, William McIntosh, C. & N. W. Ry.; Vice-President, John Hickey, Northern Pacific, and E. A. Williams, Soo Line; Secretary, W. D. Crosman, *The Railway Age and Northwestern Railroader;* Treasurer, H. L. Preston, C., St. P., M. & O. Ry. Six new members were admitted. The Club had a banquet at the Ryan Hotel after the meeting.

PERSONAL.

—Creed Hammond, for many years chief counsel of the Southern Pacific Railroad Company, died in San Francisco this week.

—Railroad Commissioner James W. Wilson, of North Carolina, Chairman of the Board, has been re-elected by the Legislature for six years.

—Mr. Matthew W. Yarrington, until recently Secretary and Treasurer of the Richmond & Petersburg Railroad, died in Richmond last week, aged 73 years.

—Mr. E. B. Parker, Assistant General Passenger Agent of the Missouri, Kansas & Texas has resigned and will remove to Houston, Tex., and engage in the practice of law.

—Mr. F. L. Pomeroy, General Freight Agent of the New York, Lake Erie & Western, resigned this week and the duties of the position have been divided among the assistant general freight agents.

—Mr. B. F. Mitchell has been chosen Freight Commissioner of the Memphis Merchants' Exchange. Mr. Mitchell was formerly General Freight Agent of the Newport News & Mississippi Valley.

—Mr. Chauncey J. Stedwell, Superintendent of the Michigan Division of the Cleveland, Cincinnati, Chicago & St. Louis, has resigned. He was formerly Superintendent of the Cleveland & Indianapolis divison.

—C. E. Brotherton, Superintendent, George Hofmaster, Assistant General Freight Agent, and Frank Tibbets, Superintendent of Roadway, of the Kansas City, Wyandotte & Northwestern, have resigned.

—Mr. J. J. R. Croes, M. Am. Soc. C. E., has been appointed Consulting Engineer for the sewerage and drainage works of Salt Lake City, where he will go at once to examine and report upon the plans with the City Engineer.

—Mr. George H. Vaillant, Second Vice-President of the New York, Lake Erie & Western, has declined the offer of a Vice-Presidency of the Philadelphia & Reading Railroad with charge of the Commercial and Traffic Department which was recently tendered. It is said that the salary offered was $25,000.

—Mr. W. H. Starr, Superintendent of Transportation of New York, Lake Erie & Western, resigned that office last week to become General Manager of the North Hudson County Railroad which controls the street car lines in Hoboken, N. J.. and the elevated cable road leading from the Hoboken ferry. Mr. Starr has been connected with the New York, Lake Erie & Western for seven or eight years, first as a rodman in the engineering corps. He has been Superintendent on the Delaware and other divisions, and became Superintendent of Transportation in January, 1891, having been previously Assistant Superintendent of Transportation.

—Col. James H. Howe, for several years general counsel of the Chicago, St. Paul, Minneapolis & Omaha, died in Boston on Jan. 4. Colonel Howe had been for over 25 years connected with the legal department of the Northwestern system, and at the time of his death was a director in a number of its companies. He was born in Turner, Me., 67 years ago. During the war he served as colonel of a Wisconsin regiment. He entered railroad life with the Chicago & Northwestern as an attorney. Three sons and one daughter survive him. A few months ago he was compelled, on account of failing health, to relinquish his position as general counsel of the C., St. P., M. & O. One of his old associates with that road said: "He was one of the most genial and companionable men I ever saw. He was an excellent lawyer, a man of wide experience and great capacity, and thoroughly fitted for the responsible position which he held." Any one who was so fortunate as to know Colonel Howe personally cannot fail to voice the above statement.

—Mr. Eckstein Norton, the well-known financier, died shortly before midnight on Jan. 12, at his home, New Brighton, S. I., from heart disease. He had been at his office in New York during the day and had appeared to be in his usual health. He was born at Russellville, Ky., in 1831, and when he was 20 years old was running a store in his native place. In 1854 he went to Cairo, Ill., and made a contract with the Illinois Central Railroad to forward its freight along the Mississippi and Ohio rivers. With his brothers he formed a banking firm at Paducah, Ky., in 1857. In 1884 he established the firm of Norton, Slaughter & Co., in New York. He reorganieed the New Orleans & Ohio Railroad in 1870 and consolidated it with the Mississippi River Railroad under the name of the Paducah & Memphis Railroad. His connection with this line continued until 1881. It was, however, through his connection with the Louisville & Nashville road that he was best known. In July, 1884, he entered its Board of Directors, in the following October he was made its Vice-President, and three years later he was elected President, holding that office until 1891. Mr. Norton remained a Director of the company, and he held similar offices in the Mexican National Railroad, the Mechanics' Bank, the Bank of the State of New York, and the First National Bank of Staten Island. A widow and six children survive him.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—The office of M. A. Zook, as Engineer of Maintenance and Way of the Alabama Great Southern Division of the Queen & Crescent Railroad, has been removed from Chattanooga to Birmingham, Ala.

Baltimore & Cumberland Valley.—At a meeting of the stockholders, Jan. 12, the following directors were elected: John P. Culbertson and W. F. Eyster, of Chambersburg, Pa.; George B. Cole and John W. McPherson, of Shippensburg; C. W. Humrichouse, of Hagerstown; D. J. Foley and J. M. Hood, of Baltimore; and J. W. Humbird of Cumberland, Md. The following officers were elected: David Wills, of Gettysburg, President; T. M. Mahon, of Chambersburg, Secretary; D. F. Foley, of Baltimore, Treasurer.

Bloomsburg & Sullivan.—At the annual meeting held in Bloomsburg, Pa., Jan. 10, the following directors and officers were elected: Hon. C. R. Buckalew, M. McMichael, Saml. Wigfall, H. J. Conner, J. H. Kershow, E. W. Clark, Jr., Chas. Evans, L. E. Waller, and J. K. Grotz; C. R. Buckalew, President; S. Wigfall, Vice-President and Treasurer; H. J. Conner, Secretary, and F. M. Leader, General Manager.

Chambersburg & Gettysburg.—The stockholders elected the following directors at Gettysburg, Pa., Jan. 11: C. D. Wood, W. H. Male, W. B. Parsons, New York; W. S. Pilling, T. I. Crane, Philadelphia; J. P. Ranney, Graeffensburg; J. B. White, Greenwood. Officers were elected as follows: President, W. S. Pilling; Vice-President, W. H. Male; Treasurer, Joseph P. Ranney; General Manager, T. I. Crane.

Chicago & Erie.—Frank M. Caldwell, Division Passenger Agent of the Chicago & Erie, has resigned that position, and will enter the employ of the Guarantee Investment Co., of Nevada, Mo., with headquarters at Kalamazoo, Mich.

Chicago & Great Western.—J. S. Winnett, Division Freight Agent at Des Moines, Ia., has been transferred to Chicago as Commercial Agent.

Columbus, Hocking Valley & Toledo.—H. F. Sockridge has been appointed Master Mechanic, with headquarters at Columbus, O.

Dayton & Union.—At the annual meeting of the stockholders at Dayton, O., Jan. 11, the following directors were re-elected: M. D. Woodford, Eugene Zimmerman, F. H. Short, John T. Dye and G. F. Osborne, of Cincinnati; H. F. Shoemaker and J. B. Layng, of New York, and Joseph Ramsey, Jr., and C. W. Fairbanks, of Indianapolis.

Denver & Westminster.—A meeting of the Board of Directors of the company was held at Denver last week. Henry J. Mayham was elected President; D. R. C. Brown, Vice-President; James M. Downing, Secretary, and Roger W. Woodbury, Treasurer.

Fonda, Johnstown & Gloversville.—At the annual meeting held in Gloversville, N. Y., the following Directors were elected: H. Walter Webb, William Littauer, Theodore Voorhees, John Carstensen, Nathan Guilford, H. L. Sprague, F. A. Harrington, L. N. Littauer, W. J. Heacock, George F. Mills, Lewis Vieghte, C. W. Judson.

Grand Trunk.—J. Trenaman, Eastern District Superintendent at Richmond, Que., one of the officials affected by the abolishing of all the district superintendencies, has been temporarily transferred to Prescott, Ont., as agent of the company there.

Granite Hill.—Chartered in Pennsylvania by David Wells, Gettysburg, Pa. T. Barton Jones, President, and W. H. Thorne, Baltimore; Wm. P. Quinby, J. Emory Bair and John A. Livers, Directors, Gettysburg, Pa.

Great Northern.—The following appointments are announced: W. J. Byrth, General Agent at Cincinnati; H. G. McMicken, General Agent at Toronto, vice J. M. Huckins, resigned; John A. Donaldson, General Agent at Winnipeg. The agency at Cleveland is abolished.

International & Great Northern.—At a special meeting of the Board of Directors on Jan. 10, George J. Gould was elected President of the road and Edwin Gould elected Director, both to fill the vacancies caused by the death of Jay Gould.

Iowa Central.—J. P. O'Brien has been appointed Superintendent in Charge of Transportation, with office at Marshalltown, Ia.

Lehigh & Pavilion.—The following directors have already been elected: H. S. Drinker, Philadelphia; Robert H. Sayre, of South Bethlehem, Pa.; William Connell, Scranton, Pa.; E. L. Fuller, Scranton, Pa.; Charles H. Root, Le Roy, N. Y.; Gen. C. F. Bissell, Le Roy; Hon. Donald McNaughton, Arthur C. Yates, and Joseph W. Taylor, Rochester.

Lehigh Valley.—The annual meeting was held at Philadelphia Jan. 17. The following officers were elected: President, Elisha P. Wilbur; Directors, Charles Hartshorne, William L. Conyngham, William A. Ingham, Robert H. Sayre, James S. Blakeslee, John R. Fell, Robert J. Lembert, John B. Garrett, Charles B. McKee, George C. Thomas, Rollin H. Wilbur, and William H. Sayre.

The appointment is announced of V. Blackburn as Master Mechanic at Buffalo, N. Y., to succeed James Cunningham, resigned. Mr. Blackburn was formerly Division Master Mechanic on the New York, Lake Erie & Western.

Mahoning & Allegheny.—The following are the first Board of Directors of this Pennsylvania company: J. C. Baker, Oak Ridge, Pa., President; Henry Williams and Syndon E. Adams, Oak Ridge, Pa.; R. H. Williams and Horace A. Noble, Buffalo, N. Y.; Grier C. Orr and Orr Buffington, Kittanning, Pa.

Minneapolis, St. Paul & Sault Ste. Marie.—Henry L. Hunter has been appointed Superintendent of Car Service, with offices at Minneapolis.

New Orleans & Pacific.—The company at its annual meeting in New Orleans, Jan. 18, elected the following directors: Edwin Gould, George J. Gould, C. E. Satterlee, J. C. Denis, A. Schreiber, Adolph Meyer, Robert Strong, Russell Sage, Howard Gould, W. B. Schmidt, Samuel Boyd, S. S. Prentiss, Alfred Moulton, E. B. Wheelock. The directors elected E. B. Wheelock President, Alfred Moulton, Vice-President, and Robert Strong, Secretary and Treasurer.

New York, Lake Erie & Western.—Several important changes have been announced as the result of the resignation of General Freight Agent F. L. Pomeroy. H. S. Burgesser, Assistant General Freight Agent, has been placed in general charge of the office, with special jurisdiction over competitive freight business and in charge of the foreign freight and freight claim department. He will represent the Erie on the freight committee of the Trunk Line Association. Assistant General Freight Agent J. Deuel, whose office has been at Buffalo, will remove his office to New York and have special jurisdiction over all local freight traffic east of Buffalo. F. E. Tilden, for many years Freight Claim Agent, has resigned and, as above stated, the duties of that office will be under the supervision of H. S. Burgesser.

W. H. Starr, Superintendent of Transportation, having resigned, the duties of that position have been assumed by C. R. Fitch, General Superintendent, Jersey City, N. J.

Ohio Valley.—Traffic Manager L. F. Day has appointed E. C. Dunbeck Assistant General Freight Agent and S. W. Moore Contracting Agent at Memphis, Tenn.

Philadelphia Elevated.—The incorporators of the company are: W. H. O'Brien, President; Dennis J. McCarthy, Wm. M. Boileau and John J. Green, all of Philadelphia.

Philadelphia & New England.—The new officers of the Pennsylvania Company are as follows: President, Stephen Holmes, of Stroudsburg, Pa.; directors, J. Ottenheimer, New York; E. A. Bell, Stroudsburg; W. H. Tinsman, Phillipsburg, N. J.; Edward F. Peters, Bushkill, Pa.; Philip F. Fulmer, Dingman's Ferry; J. H. Van Etten, A. D. Brown, Henry B. Wells and A. E. Lewis, of Milford, Pa.; Obadiah P. Howell and Benjamin Ryall, of Port Jervis, N. Y., and Roy Stone, N. Y.

Philadelphia, Wilmington & Baltimore.—Lewis J. Allen, of Trenton, N. J., has been appointed Assistant Engineer of the Delaware Division of the Philadelphia, Wilmington & Baltimore, with headquarters at Clayton, Del.

Roxborough.—The following officers have been elected for this branch of the Pennsylvania: President, Samuel Rea; Secretary, F. W. Swartz; Treasurer, Tabor Ashton; Directors, Henry D. Welsh, H. H. Houston, George Wood, William A. Patton, William P. Dixon, Francis S. Cantrell, John C. Klauder and Charles L. Hamilton.

St. Louis, Vandalia & Terre Haute.—The annual meeting was held at Greenville, Ill., Jan. 11. The Directors elected were: T. D. Messler, James McCrea and John E. Davidson, of Pittsburgh; W. R. McKeen, Chas. H. Sebt, E. O. Stanard, R. L. Dulaney, A. G. Henry and J. S. Peers. The Board organized by the election of the following officers: John E. Davidson, President; S. B. Liggett, Secretary, and T. H. B. McKnight, Treasurer.

Texas Central.—At a meeting of the directors of this company the following officers were elected: Henry K. McHarg, New York, President; Charles Hamilton, Waco, Tex., Vice President and General Manager; Richard Oliver, Waco, Tex., Secretary and Treasurer.

Western Railroad Association.—The annual meeting was held at Chicago, Jan. 11, and the following officers were elected for the ensuing year: President, B. F. Ayer; Secretary, C. R. Babcuf; Treasurer and General Counsel, George Payson. The following named railroad officials constitute the Board of Directors for 1893: B. F. Ayer, W. H. Lyford, John Newell, H. H. Poppleton, J. H. Wood, W. H. McDoel, T. F. Withrow, A. J. Earling, B. C. Cook, J. D. Springer, W. F. Merrill, E. St. John.

Williams Valley.—The annual meeting was held at Tower City, Pa., Jan. 9. Col. John Jameson, of Bloomsburg, Pa., was elected President, and C. M. Kaufman and E. F. Philips, Tower City; J. W. Durbin and Amos Lebo, Williamstown; J. M. Blun. and Edward Lebo, Lykens; Carroll R. Williams, Philadelphia; A. F. Baker, Norristown, Directors.

Wyoming & Utah.—Following is a list of the officers of this company: President, Charles A. Sherman, Boone, Ia.; Vice-President, Albert L. Bonnaffon, Philadelphia; Treasurer, Benjamin W. Rowell, Boston, Mass., and Secretary and General Manager, Isaac Van Horn, Lincoln, Neb.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Altoona & Philipsburgh Connecting.—The contract for grading from Philipsburgh, Pa., on the Beech Creek road to a connection with the Altoona, Clearfield & Northern at Janesville, a distance of 20 miles, will be let on Feb 1 next. The maximum grades are 70 ft. a mile, and the maximum curvature is 12 deg. There will be three 50-ft. bridges, and about 500 lineal feet of trestling. The proposed route is underlined with bituminous coal, in several places as many as six veins. Samuel P. Langdon, Bullitt Building, Philadelphia, is President, and W. J. Forsythe, Altoona, Superintendent and Engineer.

Baltimore & Harrisburg.—Messrs. Wright & Langhorn, of Virginia, the contractors for the line to York, Pa., have nearly finished grading this road from Porter's Siding northeast to York, and rails have been laid from Porter's Siding as far as Spring Grove, and at that point the bridge is nearing completion. The cold weather retards the progress of construction, but with favorable weather the line will be rapidly completed to York. The line will be in operation early in the spring. The line is 12 miles long, and will be operated by the Western Maryland.

Bedford Belt.—A project has been started for building the line from Bedford southwest to Columbus, Ind., a distance of about 40 miles, and it is stated that a preliminary survey will be commenced very soon. The line seems to be projected as an extension of this road and this company undoubtedly has some connection with the project, but whether it will undertake to build the line under the present charter is not evident. J. K. Zollinger, Louisville, Ky., is Chief Engineer.

California & Nevada.—Work will be begun at once by A. A. Grant on the first five miles toward Walnut Creek from the present terminus at Bryant, which is 22 miles from Emery's, on the Alameda County shore, where the line begins. The five miles of new road will be completed in about 60 days. The construction outfit has left Los Angeles.

Chesapeake & Ohio.—The second track being built on the Huntington and other divisions of this system has been several times described in these columns. Last year about 23 miles of double track was built, 14 miles in West Virginia and 9 miles in Virginia, and additional second track will probably be built this year. The company also built several branches last year from various points on its system, principally to reach coal or iron mines. The grading on the Buckingham branch, for which C. D. Langhorne, of Richmond, Va., has the contract, has been about completed and track has been laid for more than half the distance. The branch will extend from Arvon south to the mines of the Rosney Iron Co., of Rosney, Va., about 17 miles. The principal new work is in West Virginia; the Gauley, Keeney Creek and South Side branches, which are now under construction, being located in that state. The masonry and grading on the Gauley branch from Gauley to 20 Mile Creek, nine miles, is now about completed. Work on the superstructure of New River bridge will be commenced shortly. The Keeney Creek branch is being built from Nuttall to Withrow's Mills, about six miles, and the grading is now about completed except on one mile at the upper end. The tracklaying will be started on both these branches in about 60 days or earlier, if the weather is favorable. The South Side branch is being built on the south side of New River from Rush Run, W. Va. The track has been laid for about five miles and the grading is about half completed on an additional five miles. The Kinnickinnick branch has been completed from Freestone, Ky., and is now being operated for about 12 miles.

Chicago, Grand City & Terre Haute.—This company has filed articles of incorporation in Illinois for a line from Chicago to Grand City and Terre Haute, Ind. The principal office is in Chicago, and the capital stock is $2,000,000. The incorporators and directors are Isaac F. Dyer, W. F. Boss, Charles J. Stramburg, A. J. McDonald, H. G. Leed and C. D. Hindman.

Chicago & Hammond.—Articles of incorporation of the company were filed at Springfield, Ill., this week. It is proposed to build a railroad from Chicago to a point on the Illinois and Indiana State line. The capital stock is $200,000. Incorporators and First Board of Directors are: Frank H. Bowen, Albert H. Valentine, Dennis Ward, Wm. P. Black and William H. Fitzgerald.

Colorado Midland.—Work on the Cripple Creek narrow guage extension progresses rapidly. Price & McGavock, contractors, are employing 300 men. The road is practically all graded; the ties have been distributed, and the rails purchased. The first eight miles will be laid by Feb. 1, and trains will be running soon after from Divide, on the Colorado Midland, north to the town of Midland, Col.

Consolidated Terminal (Kansas City).—About two miles of new road was built by this company last year from the Central Station in Kansas City to a point on the Kansas River in Kansas. The line is practically an extension of the Kansas City Suburban Belt into the stockyards and packing districts of the city. It is being extended from the Kansas River to Argentine, Kan., five miles, under the charter of the Union Terminal Railroad. The construction of this part of the line has been delayed on account of the refusal of the Missouri Pacific to allow the new road to cross its track, but recently the Kansas Railroad Commissioners have issued an order authorizing the crossing to be made.

Creede & Gunnison Short Line.—C. A. King, Engineer, is making a survey of a line from Creede, Col., to Bachelor Camp, the mining village at the bonanza mine Amethyst. The line proposed is seven miles long and will make an ascent of 1,500 ft. It is proposed to continue the survey over the range to Gunnison. Railroad men do not consider the scheme feasible.

Dry Fork.—This company was chartered on Dec. 15 to build a standard gauge road from a point on the West Virginia Central & Pittsburgh road near Hendricks, along Cheat River, and through the valley of Dry Fork of Cheat to the headwaters of Greenbrier River, thence to the Chesapeake & Ohio Railroad, through Pocahontas and Greenbrier counties, W. Va. The road is intended to open up large timber and coal lands in the Greenbrier divide, owned by the incorporators, who are Martin Lane, of Wilmington, Del.; Levi C. Condon, of Baltimore; John L. Hummell, of Philadelphia; James B. Rees, of Rees Tannery, W. Va., and R. F. Whitmer, of Philadelphia. John W. Moore is Chief Engineer of the road, and three preliminary surveys of the route as far as the headwaters of the Greenbrier River have been made. Mr. Moore received orders last Monday, after having submitted the preliminary line, to make the final location of the line, and prepare plans and specifications upon which bids may be received.

Gaspesia.—Hon. Jos. Tassie, Charles Lionnais, C. E.; Joseph Emard; David H. Henderson; Charles H. Walters, banker; Finlay McRea, contractor; Joseph McLean; Camille Provost, contractor, of Montreal, Que.; Louis M. Langlair, of St. Octave de Remouski, Que., and Louis Zephirin Joncas, M. P., will apply for a charter of this line from the Quebec Legislature. It is proposed to build from a point on the Intercolonial, between Ste. Flavie and St. Octave de Metis, to St. Jerome de Matane, and thence through Rimouski and Gaspe counties, to the Gulf of St. Lawrence, near Pointe St. Pierre, on the south shore near the mouth of Gaspe Bay.

Granite.—The charter for this line was filed at Harrisburg, Pa., Jan. 11. The road is to extend from a connection with the Baltimore & Harrisburg, near Granite Station, about one mile, to a point near Granite Hill Quarry, in Straban Township, Adams County, Pa. David Wills, Gettysburg, Pa., is President.

Jonesville & Lockhart Shoals.—The officers expect to have the surveys completed this month between Jonesville and Lockhart, S. C., about 16 miles, and it is announced that the contract will be awarded in a short time. The company has been voted a subscription of $20,000 in township bonds. C. D. Farrar, of Union, S. C., is President.

Kanawha & Michigan.—The cold weather has caused the suspension of all construction work on the Gauley extension. The grading was discontinued at Christmas at Kanawha Falls and the contractors have been able to do very little work since that time, but the work will be resumed as soon as the weather permits. The piers for the bridge at the mouth of the Gauley River are completed and the material for the superstructure on the ground, but as the river is frozen over six inches thick the work may be delayed some weeks until the stream is clear of ice. The stone work for the bridge at Narrows Falls is not yet completed and has also been suspended. The extension is 32 miles long from Malden to Gauley Bridge, W. Va., where it will connect with the Chesapeake & Ohio. The line is being built by J. S. Casement, of Painesville, O.

Lackawanna, Catskill Mountain & Boston.—A charter for this line was secured in New York last week. The line is to extend from Deposit, Broome County, to Schenectady, a distance of 130 miles. The directors are: John Kelly, Benjamin S. Harmon, George T. Aldrich, S. W. Hartridge, Edmund Bliss, Paul Grout and John Davis, of New York; G. F. Shaver, of Yonkers, and Arthur F. Rice, of Passaic, N. J. This is probably the road for which a survey was recently completed through the Schoharie Valley, in New York.

La Porte, Houston & Northern.—The locating survey for the Clear Creek extension is now being made. The route is from La Porte, to which point the road has been graded to the mouth of Clear Creek, on Galveston Bay, where it will connect with the North Galveston, Houston & Kansas City road, now being built. The contract for the grading and bridging was recently let to J. F. Allen, of La Porte, Tex., as already noted. The extension is about eight miles long. T. W. Lee is General Manager, and C. G. Woodbridge, of La Porte, Tex., is Chief Engineer.

Laurel River & Hot Springs.—Surveys have been made for about 24 miles of this line from Hot Springs, N. C., up Laurel River to the mouth of Foster Creek. L. H. Wheaton, of Hot Springs, N. C., has the contract for the first seven miles from that point to Gahagen, N. C. The stockholders are mostly residents of Lynn, Mass., and George H. King, of Lynn, is General Manager. H. M. Ramseur, of Hot Springs, is Chief Engineer.

Lonaconning & Cumberland.—The Lonaconning & Cumberland Railway & Power Co. was chartered last week in Maryland. The incorporators are: George W. Clark, J. J. Bell, of Lonaconning, Md.; James B. Stewart and Frank V. L. Turner, of Washington, D. C., and William Pearre, of Cumberland, Md. The paid-up capital stock is $250,000, in $50-shares. The road will extend from Cumberland to Westernport, Md., and will pass through the towns of Frostburg, Barton, Ocean, Midland, Mullen, Lonaconning, Pekin, Moscow, Phœnix and Franklin. The road will, throughout most of the distance, follow the public highway, the County Commissioners of Allegheny County, Md., having on Friday last granted that privilege under favorable conditions. The road will be about 26 miles in length and will be operated by an overhead trolley system. Its charter permits it to carry passengers and all freight except coal. It is the intention to ask for bids on the work in a few weeks.

Louisiana Nickel Plate.—The road was extended last year from Allendale to Hainesville, La., four miles, the end of track being now about seven miles south of Bellevue, La., which is the proposed terminus of the road. Allen Bros., & Wadley, of Haughton, La., have the contract for building the road into that town. Extensions of about 30 miles are proposed which will include a line north to Stamps, Ark., on the St. Louis Southwestern, but nothing definite has been done toward beginning work on this line.

Loup Creek & Piney.—Secretary of State W. A. Ohley, of West Virginia, last week granted a charter to this company, which proposes to build a road from the terminus of the Chesapeake & Ohio's extension up Loup Creek in Fayette County, W. Va. (now building), thence to the point where Boyer's Creek empties into Piney Creek, in Raleigh County, with a branch down Piney Creek, to the mouth of Little Whitestick. The capital is $100,000 and is held by C. H. Carter and Samuel Spicer, of New York City, and A. H. Gillard, W. S. Townsend and T. W. Joyce, of Brooklyn, N. Y. This road will be practically an extension of the Chesapeake & Ohio into the New River coal fields.

Mahoning & Allegheny.—This company was chartered in Pennsylvania last week. The line is to extend from a point on the Allegheny Valley road near the mouth of Mahoning Creek, in Pine Township, Armstrong County, Pa., to the village of Putneyville, a distance of 11 miles. The capital stock is $110 000; J. C. Baker, Oak Ridge, Armstrong County, Pa., President.

Mankato & Northern.—P. H. Carney, of Mankato, Minn., president of the road, states that active construction on the line will probably begin at Mankato shortly. The right of way has been nearly all secured and the surveys were completed for over 50 miles in 1892, but it is not proposed to build that amount of new track at present.

Milwaukee & Northern.—A branch of 17 miles was built in Wisconsin last year from Wausaukee on the main line to the lumber camp of the Oconto Lumber Company. The line to the Oconto Lumber Co.'s camp was built for the primary object of hauling logs from the pine woods to the mills at Oconto, Green Bay and Menominee. The trains running upon that road do a mixed business, which consists principally of supplies to the lumber camps and the transportation of the lumbermen and woodsmen in their employ.

Monterey & Mexican Gulf.—A branch is being built from Matamoras, Mex., for about 26 miles, the contractors being Moylan Brothers, of Pueblo, Mex. The work has been completed to Chietlar, about 14 miles, and work is now going on on the last 12 miles.

Montreal Island Loop.—J. Narcisse Dupuir, N. A. Hurteau, N. B. Desmarteau, O. M. Ange, Q. C., of Montreal, Que.; T. E. Normand, of Three Rivers, Que.; George Ball of Nicolet, Que., and Felix Carbray, of Quebec, Que., will apply to the legislature for a charter for this road to build a road on the Island of Montreal, from the city of Montreal through the municipalities on the island.

Montreal & Western.—The last rail on the line to Ste. Jovite, Que., was laid Saturday, Jan. 7.

Norfolk & Western.—Referring to the passage of the bill by the House of Representatives for the admission of the road into the District of Columbia, a local paper says: "There have been three surveys made of the proposed route to Washington. One is from Berryville, the second from Front Royal, and the third from Luray. This last is the one that will probably be selected. The approximate length of this line is 75 miles, which would make the distance from Roanoke to Washington over the new road 225 miles. This is a saving of 56 miles over the present route via Shenandoah Junction, and about 25 miles by the way of Lynchburg."

Otis Elevating.—This road is being extended about one mile from Mountain Station, N. Y., the terminus of the cable line to Catskill Station, connecting there with the Catskill Mountain road. Mairs & Lewis, 18 Broadway, New York, who were the contractors for building the cable line up Catskill Mountain, are building the short extension.

Pennsylvania Company.—A branch to Bishop, Pa., about a mile long, from a point on the Bridgeville branch, has been recently opened. In 1888 a branch line was built from Bridgeville, on the Chartiers road, in Allegheny County, Pa., in the direction of McDonalds, a distance of $6\frac{6}{10}$ miles, to Reissing, Pa. This line has been in operation for over a year. During 1892 a branch line has been built from Cecil, a station on the Bridgeville and McDonald branch, up the valley of Miller's Run to Bishop, Pa., $1\frac{2}{10}$ miles, which is now also in operation. All these branches are coal lines, although some little passenger traffic is done upon them.

Peoria Terminal.—Little over a mile of road was built by this company from Bartlett toward Peoria, Ill., in 1892, and it is now building two miles of double track in Peoria. Surveys have been made for an extension, but nothing definite has been done toward building any road except the few miles at Peoria. C. C. Gilman, of Marshalltown, Ia., now of Peoria, has the contract for this work.

Philadelphia Elevated.—The company was chartered in Pennsylvania this week with a capital of $150,000. The proposed line is to extend from Sixth and Sansom streets to Twenty-second, to Walnut, to Fortieth, to Baltimore avenue, thence to a point in Delaware County near the intersection of Cobb's Creek and Baltimore avenue, about five miles. W. H. O'Brien, of Philadelphia, is President.

Phœnix, Mt. Olive & Mesa.—This company, recently chartered in Arizona, has elected the following officers: President, Benjamin E. Lower; Secretary, Warwick Scott; Treasurer, T. W. Hine, all of Phœnix, A. T. The road will be about 25 miles in length, and will extend from Phœnix through Mt. Olive and Tempe to Mesa City. The route has been surveyed and prospect of buil ding is fair. The grades will not exceed one per cent. The only iron bridge will be over the Salt River, and the Maricopa & Phœnix will probably be used.

St. Louis, Chicago & St. Paul.—Surveys are now being made for a branch through Calhoun County, Ill., which is the county forming the peninsular lying between the Mississippi and Illinois rivers, the mouth of the latter being just below Grafton. A survey is being made from Grafton north

along the west side of the Illinois River to Hardin, the county seat of Calhoun County, about 20 miles. It is stated that the line will be built immediately if Calhoun County will vote a subsidy of $100,000 to the company. The survey crosses the Illinois River near Grafton, but no estimates as to the cost of the bridge have been made. Besides this branch it is also proposed to build a line from Alton along the Mississippi River levees to East St. Louis, about two miles. Henry O'Hara St. Louis, is President.

St. Louis, Keokuk & Northwestern.—The tracklaying on the new line through St. Charles County into St. Louis has been progressing at the rate of one and a half mile a day until recently, the work being now completed for 20 miles from Cuivre Junction on the existing road. The distance from Cuivre Junction to the Bellefontaine Bridge now being built over the Missouri River is about 32 miles, and the distance from that point into St. Louis is 10 miles. This new line when completed will give the Chicago, Burlington & Quincy a new entrance into St. Louis, and the trains of the Missouri, Kansas & Texas will also run over the new line into St. Louis from a point in St. Charles County.

Staten Island Rapid Transit.—Drake & Stratton, of 143 Liberty street, New York City, have the contract for the South Beach extension from Arrochar, N. Y. At present they have only about 30 men, which number will be greatly increased shortly. There is about 2,000 cu. yds. of masonry to erect and two iron bridges, one being a highway bridge crossing Richmond avenue and one double track bridge crossing Old Town road. The maximum grade will be 79 ft. a mile for a distance of about four-fifths of a mile, commencing this grade by lowering the present tracks about 1,000 ft. south of Fort Wadsworth station; the maximum curvature is eight degrees. The length of extension will be 0.86 of a mile and the length of lowering the present tracks 0.23 of a mile, making a total of 1.09 miles of double track road to be constructed. It is a very heavy and expensive piece of work, there being about 87,000 cu. yds. of excavation. The contractors will complete the work by May 1, 1893. F. J. Rotheroe, New York City, is Assistant Engineer in charge of the work.

Texarkana & Fort Smith.—Trains on this road are now running for 26 miles north of Texarkana, Tex., the northern terminus being at Wilton, Ark, the line being opened to the latter town, which is nine miles north of Hudson, late last year. The company has 10 miles still to build to reach Little River, and the line will be gradually extended until the track reaches that point, probably during next summer.

Union Pacific.—Work progresses slowly on the narrow guage extension up Anthracite Creek to the anthracite coal fields near Irwin, Col. This branch leaves the main line at Castleton, about eighteen miles west of Gunnison. The company is building the line, but work is retarded because of the heavy snow. The company is also building a six-mile extension of its Red River branch from Catskill, N. Mex., on the Fort Worth division, for the purpose of reaching timber on the Maxwell Grant. A survey is now progressing to extend it 10 miles further in the spring to reach a new and unopened coal field. A four-mile branch is nearly completed from Louisville, Col., to the Allen-Bond coal mines, the rails now being laid.

Washington County.—An act was introduced in the Maine Legislature last week to incorporate this company, S. N. Campbell and others being named as incorporators. The charter provides that the road shall extend from Calais, through Hancock and Washington Counties, to the Maine Central in Hancock County.

Wekiva, Bronson & Northwestern.—The Suwannee River Phosphate Company, which is building this road, failed to do much construction work on the line in 1892, the principal cause of the delay in the grading being due to the very wet weather. It is now proposed, however, to resume work in February. The road is to extend from Bronson northwest to Franklin, 35 miles. Charles P. Turner, of Judson, Fla., is Chief Engineer.

Winchester & Beattyville.—An extension of this line is proposed to Boonville, Ky., about five miles south of the present terminus at Beattyville, Ky. The road has just been completed from Beattyville to Beattyville Junction, Ky., on the west branch of the Kentucky River where the Kentucky Union Railroad crosses the river, the distance being about six miles. Robert Wallace, Versailles, Ky., is General Manager and J. H. Pearson, Beattyville, Ky., Chief Engineer.

Wyoming & Utah.—The route of this road is described as follows: From Casper, Wyo., southwesterly through the valleys of the Platte and Sweetwater to Ogden, Utah, with two branch lines, one from the main line south to Rawlins on the Union Pacific, and one north from the main line to Lander, Wyo. The surveys will probably be commenced next spring. Isaac Van Hom, Lincoln, Neb., is General Manager.

GENERAL RAILROAD NEWS.

Bradford, Eldred & Cuba.—This road, which runs from Wellsville, N. Y., to Allentown, Pa., was closed on Saturday last, Jan. 14, and traffic will be abandoned. The court at Corning, N. Y., issued an order last week closing the road, as the business has not been sufficient to pay the operating expenses.

Cleveland, Akron & Columbus.—A suit was begun in the Ohio courts last week by Edward L. Mortimer for the appointment of Receiver for the road and making charges against the directors. The directors and officers of the company contradict all the allegations of Mortimer, and state that the property is in sound physical and financial condition, and has been honestly managed, and that the suit is an attempt to discredit the directors without good cause. Mortimer is not a stockholder on the company's books.

Jacksonville, Tampa & Key West.—The United States Circuit Court of Appeals, at New Orleans, Judges Pardee and McCormick sitting, this week vacated the order made by Judge Swayne in Florida in August last, by which, upon the motion of the American Construction Co., Mason Young was appointed Receiver of the road, directing the court below to discharge the Receiver and to restore the property to the officers of the railroad. At the same time, in the suit of the Pennsylvania Co. for Insurance on Lives, the Court of Appeals restored the receivership of the property covered by the mortgage of the same company to the Pennsylvania corporation, which Judge Swayne, also upon the motion of the American Construction Co., vacated when he appointed Young Receiver in the other suit.

Lehigh Valley.—At the annual meeting of the stockholders at Philadelphia, Jan. 17, Elisha P. Wilbur was re-elected president. The resolution ratifying the lease of the property to the Philadelphia & Reading road met with some opposition, but when the vote was taken only two of the stockholders voted against it.

Malone & St. Lawrence.—The stockholders of the road formally ratified the lease of that road to the Central Vermont at a meeting in New York, Jan. 18. The first-named road is controlled by Dr. W. Seward Webb, and it has been operated by him independently under a temporary agreement with the Central Vermont. It extends from Malone, N. Y., north to Valleyfield, Que.

New York, New Haven & Hartford.—Bids for 13,223 shares of stock were opened last week. Drexel, Morgan & Co. were the highest bidders, and the entire block was sold to them for $255.07 a share. The money which will be received from the sales, amounting to $3,400,000, will be used in taking up a floating indebtedness incurred in betterments principally in four-tracking the New York Division and double-tracking the Shore Line Division.

Panama.—The Attorney General of New York State has been asked to institute a suit demanding that the property of this company be placed in the hands of a receiver, the substance of the complaint being that the road is managed for the benefit of the Panama Canal Co. to the injury of the minority stockholders in the railroad company. The name of the complainant is not published, but Pacific Mail Steamship interests very likely are interested. It is alleged that quarries and other property of the railroad were turned over to the canal company without consideration; that extravagant prices were paid by the road for useless property bought of the canal, and that freight for the canal was carried at cost.

Quebec & Lake St. John.—This company will apply to the Legislature for an amendment to its act of incorporation empowering it to borrow money on the security of the terminal properties at Quebec.

Union Pacific.—The statement of earnings for November shows a decrease as compared with the same month last year, in both gross and net; the falling off in gross amounted to a little over 3 per cent., and in net earnings to over 7 per cent. For the 11 months to Nov. 30 the company reports an increase of more than a million dollars in both gross and net earnings. Following are the figures for November and for the 11 months:

Gross.	1891.	1892.	Inc. or dec.	
November	$4,376,433	$4,235,233	D.	$141,200
11 months to Nov. 30	40,255,862	41,305,678	I.	1,049,816
Net.				
November	1,823,235	1,687,316	D.	135,919
11 months to Nov. 30	14,138,379	15,346,370	I.	1,207,991

Western Counties.—The English syndicate having accepted the terms for taking over this road in Nova Scotia, the municipality of Yarmouth will receive $20,000 in cash, the directors $1,000 and the local stock holders twenty per cent. in new first debenture stock for their old stock, and $35,000 is to be spent in putting the line in good repair.

TRAFFIC.

Traffic Notes.

Branches of the New Orleans Car Service Association will be established at Baton Rouge, Jackson and Vicksburg.

The Columbus, Hocking Valley & Toledo and other roads in the Ohio coal district are still endeavoring to form some kind of a traffic agreement, but have as yet come to no decision.

The Pacific Mail Steamship Company has had to reduce freight rates from San Francisco to Central American ports one-half in consequence of the new "North American" line which has been established.

The Memphis Passenger Association has once more been "reorganized." The rules of this Association are very strict, and we judge from reading them that a ticket seller cannot set foot in a scalper's office without exciting suspicion, much less sell him a ticket; but there seems to be some question about the enforcement of these rules.

The grain elevators at St. Louis are so full that the railroads have had great difficulty in handling the grain brought in from the West. At the end of last week the total amount in St. Louis and vicinity was about eight million bushels. The Burlington road had 400 cars waiting to be unloaded, the Wabash nearly as many and the smaller roads were blocked in the same way.

It is announced that the Canadian Government will establish a tariff of canal tolls for this year, which will be free from the discriminations against grain vessels going to United States ports, which caused so much trouble last year. This can hardly be regarded as news, however, as the tariff of last year stipulated that the discriminating rates were to continue only during that season.

The universal desire to get something for nothing has lately been stimulated in so many ways that the desire to *give* (or pretend to give) something for nothing is spreading into all departments of business, and we now find it even among the railroads. The passenger department of the Houston & Texas Central announces that a 1,000-mile ticket will be given free to the person who travels the greatest number of miles (on tickets) on that road during 1893.

Chicago Traffic Matters.

CHICAGO, Jan. 18, 1893.

The committee on revision of the rules of the Western Passenger Association have completed their work, and have submitted the proposed amended form of the agreement to the members for consideration. Several further changes are likely to be made before it is adopted, but the general expression is one of satisfaction with the result of the work of the committee. The most important change contemplated is the establishment of local rate committees at various points, where the business warrants, who shall have power to legislate on all matters affecting only their own territory. There has always been more or less fault found because the old agreement required a vote of all the lines in matters which frequently affected only a small portion of them, and on matters of local rate-making which could be agreed to by a local committee more expeditiously than by submitting the question to the vote of the entire association.

Judge Dunne in the case of Beebe & Co. vs. the Lake Shore, holds the Illinois State law requiring the weighing of all grain in hopper scales and the giving of a receipt or bill of lading showing the correct weight, to be unconstitutional, so far as applicable to interstate shipments in that it usurps the power expressly retained by the United States to regulate interstate commerce, and also retards continuous shipments by requiring unloading, weighing and reloading.

The Western Freight Association has given notice that after Jan. 15, agents of its lines must not act for shippers in the distribution of consignments at destination shipped at carload rates.

George Stout, a ticket broker, has been held for the grand jury on the charge of altering an annual pass issued by the Burlington to Treasurer Beuel of the Western New York & Pennsylvania and subsequently stolen and disposed of to Stout, who changed the name by the use of acids and disposed of it to a detective acting in the interests of the Burlington.

The gross tonnage of eastbound freight from Chicago and Mississippi River points, exclusive of East St. Louis and Peoria, by the following lines for the year 1892 amounted to 2,703,185 tons, distributed as follows:

	Per cent.
C. & G. T	15.6
M. C	18.8
L., S. & M. S	15.9
P., Ft. W. & C	18.9
P., C., C. & St. L	6.7
B. & O	11.8
N. Y., C. & St. L	12.3
	100.0

Of this tonnage 221,844 tons was flour, 1,166,182 tons grains, 82,164 tons butter and eggs, 8,052 tons cheese, 52,031 tons lumber, 13,537 tons wool.

Shipments of flour, grain and provisions, eastbound, for the calendar year, compared with 1891, are as follows:

Road.	1892. Tons.	1892. P. c.	1891. Tons.	1891. P. c.
C. & G. T	318,352	17.3	354,159	20.6
M. C	390,660	21.3	319,008	18.5
L., S. & M. S	304,881	16.6	262,234	15.2
P., Ft. W. & C	287,467	15.7	269,967	15.6
P., C., C. & St. L	124,160	6.8	84,649	4.9
B. & O	154,933	8.4	154,830	9.0
N. Y., C. & St. L	254,434	13.9	278,213	16.2
	1,834,887	100.0	1,723,060	100.0

The Chicago, Rock Island & Pacific has established a land and immigration department, which will be under the management of J. C. Bonnell.

The cold weather has started a rush of travel to Southern winter resorts, and for about two weeks the sales of tickets in Chicago to these points have been over 250 a day.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Jan. 14 amounted to 79,736 tons, against 92,823 tons during the preceding week, a decrease of 13,087 tons, and against 119,086 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	W'k to Jan. 14. Tons.	W'k to Jan. 14. P. c.	W'k to Jan. 7. Tons.	W'k to Jan. 7. P. c.
Michigan Central	13,925	17.5	14,763	15.9
Wabash	4,567	5.7	6,353	6.8
Lake Shore & Michigan South.	11,618	14.6	12,956	13.9
Pitts. Ft. Wayne & Chicago	8,309	10.4	7,771	8.4
Pitts., Cin., Chicago & St. Louis	9,002	11.3	10,970	11.8
Baltimore & Ohio	3,025	3.8	5,149	5.6
Chicago & Grand Trunk	12,260	15.4	13,265	14.3
New York, Chic. & St. Louis	6,431	8.	9,407	10.1
Chicago & Erie	7,285	9.1	9,536	10 3
C., C., C. & St. Louis	3,314	4.2	2,653	2.9
Totals	79,736	100.0	92,823	100.0

Of the above shipments 6,348 tons were flour, 40,920 tons grain and millstuff, 11,548 tons cured meats, 10,974 tons dressed beef, 3,070 tons hides, and 3,358 tons lumber. The four Vanderbilt lines carried 44 per cent., and the two Pennsylvania lines 22 per cent.

Colorado Passenger Advertising Agreement.

A Denver correspondent sends us the following notes about the Colorado Passenger Association:

The first year's work of this Association has been most satisfactory. During the year 144 applications for reduced rates were received. Sixteen meetings were held, twelve of which were the regular monthly meetings. Though the year was an unusually busy one in Colorado, owing to the Knights Templar Conclave, the summer mountain resort business and the events incident to the presidential campaign, the actual convictions for violating rates numbered but six, and for violating the advertising agreement there were but nine convictions. Some of these were technical violations of no great moment.

This Association claims to have the best advertising agreement known, and its operations are said to be free from annoyances. Among the main points in this advertising agreement are the following:

No editorial or advertising transportation shall be issued in the absence of a regular advertising contract and then only to persons directly connected with the publication or advertising medium named in the contract. Advertising contracts may be made for cash or for transportation, with newspapers having an existence of at least 30 days, and published once a week or oftener. Applications for exceptions must be acted upon by the Association and unanimous consent is necessary.

Under the rule there are permitted some exceptions, as follows: Books or pamphlets published by leading first class hotels or the resorts of Colorado, railroad and hotel guides published by or under the auspices of railroad companies, catalogues of photographic views containing lists of views of lines which are members of the Association, general advertising of cities and localities published under the auspices or by the sanction of boards of trade, town boards or similar organizations.

Advertising contracts will not be made, nor advertising transportation issued, for the purpose of influencing the transportation of any party or organization via lines members of this Association. Editorial time passes will not be issued to a newspaper published in Colorado at a point located off the line of the road to which application is made, except upon the approval of the proper representative of the road on which the paper is published.

The jurisdiction of the Colorado Passenger Association includes Colorado only. Mr. P. J. Flynn is chairman, with headquarters at Denver. He is the executive officer, and construes the agreement as well as all rules. His decision may be reversed by a two-thirds vote.